Metals REVIEW

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THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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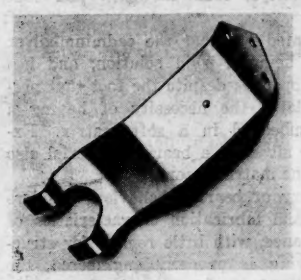
New Manganese Alloy Hardened by Low Temperature Aging

A new precipitation hardening alloy having exceptional uniformity in response to heat treatment has been announced by the W. M. Chace Co., 1612 Beard Ave., Detroit 9, Mich. This alloy has a nominal chemical analysis of 60% copper, 20% nickel, and 20% manganese. It is soft and ductile and can be either hot or cold formed into intricate shapes and then hardened by a comparatively low temperature aging treatment.



Part Made of Chace Alloy 720 Stamped, Formed and Hardened

A hardness of 400 Vickers can be obtained by aging either dead soft or cold worked material. The physical properties at this hardness are 200,000 psi. tensile strength, 170,000 psi. yield stress for 0.1% offset, and 120,000 psi. proportional limit. High freedom from "drift" and high fatigue strength make the alloy especially useful as a spring material.

Hardening to any degree between dead soft and full hard is produced by varying the time at the aging temperature. The aging temperature is always the same, 750° F., but is not critical, since it may be varied by 100° without affecting the resultant hardness. Hardened parts may also be drawn to any lower hardness by heating for a few minutes at a temperature selected between 850 and 1100° F. After heating to the latter temperature the material will be fully annealed. To reharden material softened in this manner it is only necessary to repeat the aging treatment.

The alloy has a silvery color and presents an attractive surface when polished. It is corrosion resistant, and in this respect does not differ greatly from the familiar cupro-nickels.

The deep drawing characteristics and the low work hardening rate of the alloy indicate that it may be used to advantage for corrugated diaphragms, bourdon tubing, and temperature or pressure responsive bellows. The excellent ductility both hot and cold make possible the production of corrosion resistant forgings or upset parts which may be finish machined and then hardened by heating to 750° F. The field of most varied applications, however, is in springs.

The material is known as No. 720 manganese alloy and is available in all the forms in which stainless steel is usually supplied. Bulletin A-744 gives more details on properties, heat treatment and application.

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PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention—and Pass-A-Round.

Name	Item No.	Check

File or Clip for Future Reference

This is a record of important new developments in the metal industry during the past month—Save it!

New Committee Chairmen

Prof. Clair Upthegrove of University of Michigan (left) is the newly appointed chairman of the A.S.M. Publications Committee, while J. W. Queen, Jr., of Joseph T. Ryerson & Son, Inc., Jersey City, N. J., is new chairman of the Constitution and By-Laws Committee. Complete personnel of all A.S.M. standing committees is given on page 5.

Effect of Four Methods of Steel Plant Control Described

Reported by Horace Ross
Henry Disston & Sons, Inc.

Four steel plant control practices and their influence on tensile strength, ductility and hardenability were described by A.S.M. Vice-President Charles H. Herty, Jr., before the Boston Chapter on Nov. 3. Dr. Herty is assistant to the operating vice-president, Bethlehem Steel Co. The four control methods are the carbometer, spectrographic analysis, slag control, and deoxidation in both furnace and ladle.

Dr. Herty then showed the relationship between these various controls and rolling practices and the tensile properties of as-rolled steels, grain size characteristics of steels, and hardenability. He pointed out that the grain size in which the normal heat treater is interested is that which is present at the quenching temperature rather than the grain size indicated by the McQuaid-Ehn test.

(*Continued on page* 13)

Faster and Better Cutting by Honed Tools

Reported by J. L. Petz
International Business Machines Corp.

On Nov. 13 a joint meeting of the American Society for Metals and the American Society of Tool Engineers was held at the University of Rochester. The principal speaker of the evening was A. H. d'Arcambal, vice-president of Pratt & Whitney Co., and past national president of both the societies. He spoke on "Precision Cutting Tools."

Mr. d'Arcambal has been associated with Pratt & Whitney Co. for the last 26 years, and has a wealth of practical information on this subject which he imparted to a large audience. Various types of cutting tools were described. One slide showing the difference in production between hand ground tools and a tool finely machine ground on cutting edges was of particular interest and should encourage the use of more highly finished or honed surfaces on the cutting edges.

Inside Story of Martempering Revealed

Reported by Charles L. Willets
Heat Treater, Solvay Process Co.

The inside story of martempering was revealed by B. F. Shepherd, chief metallurgist of Ingersoll-Rand, Inc., and a past national president of the American Society for Metals, before the November meeting of the Syracuse Chapter. Mr. Shepherd's talk, which has been reported in previous issues of THE METALS REVIEW, was exceedingly well received. The question period brought to light many fine points which were answered in detail by the lecturer.

Personnel Problems Raised by War's Technical Advances

Reported by R. L. Deily
Bethlehem Steel Co.

"There will be splendid opportunities for trained metallurgical men in the post-war period but these will entail equally serious obligations" was the theme of an excellent talk by E. L. Shaner, editor-in-chief of *Steel*, at the November meeting of the Lehigh Valley Chapter.

Mr. Shaner led up to his discussion of post-war metallurgy by describing some of the progress that has been made during the war period. He said that as much as ten years' peacetime advance has been compressed into the past three years under stress of war.

Advances have been made in all lines of metallurgical industry, a great many of which, of course, are still subject to security regulations. For example, we will not know much until after the war about the apparently spectacular development in blast furnaces that has been made at the experimental Republic furnace in Cleveland. Other better-known developments speeded up by war are the NE steels, the use of induction heat, flame treating, isothermal heat treating and high-speed milling.

These developments add up to an American metallurgical industry far advanced over pre-war years, which in turn will require more intelligent engineering personnel. Other forces requiring serious study are the effect of the tremendous drain on our natural resources by the wastage of war and the fact that internal and foreign competition will again make cost consideration of prime importance in our manufacturing operations.

The present and future availability of trained technical students was discussed at some length by Mr. Shaner. There are very few such persons available at present and with the spotty training during the war

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Morris Shows How Melting & Rolling Practice Affect Properties of End Product for User

Reported by John R. Dobie
Heat Treat Foreman, American Steel and Wire Co.

M. J. R. Morris, research director, Republic Steel Corp., Massillon, Ohio, described the process of melting and refining steel in the open-hearth and electric furnaces, together with the rolling practice that follows, when he addressed the October dinner meeting of the Worcester Chapter. He then went back and related the end product the user is interested in with the various operations described.

Mr. Morris described the influence of melting practice on hardenability and showed the effect of various residuals and how they mask the influence of the more common elements. Non-metallics were shown to have a bearing on machinability in that the hard, brittle types tend to dull tools.

The sulphur bearing non-metallics reduce the weldability of steels because of the hot shortness imparted. Soft spots are not always caused by decarburization, but can occur through poor soaking practice. Local absorption of oxygen during this soaking can affect the grain size and produce soft spots. Another factor causing soft spots is heavy and tenacious scale.

Mr. Morris stated that the high quality of Swedish steels can, in part, be ascribed to the rolling practice. More passes are taken to reduce the steel a given amount and this increased working imparts better properties. The influence of cooling practice after rolling is important because flakes can be prevented by proper cooling.

Inaugurating a new series of informal chats on the history of Worcester Industries, Robert W. Stoddard, vice-president of Wyman-Gordon Co., makers of aircraft forgings, recalled some very interesting highlights of his company's nearly 60 years of life and never-ceasing search for progressive ideas.

Worcester Chapter Chairman Rudolph A. Johnson of Wickwire-Spencer Steel Corp. (left) presided at the October meeting; M. J. R. Morris, research director, Republic Steel Corp. (center), spoke on "Effect of Open-Hearth Practice on the Heat Treater and Fabricator"; and Robert W. Stoddard, vice-president, Wyman-Gordon Co. (right), recalled points of interest in the history of his company.

Taper Sections to Study Surface Profile Illustrated

Reported by Taylor Lyman
University of Notre Dame

"Surface Finish" was discussed in an interesting manner by Lowell H. Milligan, assistant director of research of Norton Co., before the Notre Dame Chapter on Nov. 8. He described the use of taper sections as a refined means of studying the surface profile of specimens finished by various methods, a method developed at Battelle Institute under the sponsorship of his company. The effects obtained by varying the taper and the angle between the taper and the scratch direction were illustrated.

Interpretation of records obtained by such instruments as the profilometer and the Brush surface analyzer were discussed and the terms "rough", "shiny", "wavy" and "smooth", as applied to metal surfaces, were differentiated.

Duplex surfaces were referred to, such as the "pit and plateau" finish by Buick, especially from the point of view of their relation to problems of lubrication and friction in bearings. Some interesting correlations between the frictional properties, as tested in the Amsler machine, and the type of surface finish were revealed.

Dr. Milligan also showed some electron micrographs of abrasive particles and of surfaces ground with the same particles, and suggested that further research along this line may add materially to our knowledge of the mechanism whereby metal is removed during surface finishing.

Ottawa Valley Chapter Members Tour Hull Iron and Steel Foundries

Reported by E. W. Marshall
Ottawa Car and Aircraft, Ltd.

The second monthly meeting of the newly organized Ottawa Valley Chapter of the American Society for Metals was held Nov. 21 in the Victoria Memorial Museum, Ottawa, with Dr. Gordon S. Farnham, of Mines and Resources Bureau, in the chair. After viewing a film on "Die Castings," loaned by the New Jersey Zinc Co., the members made a tour of the Hull Iron and Steel Foundries, Ltd., through the courtesy of H. P. Coplan. The tour was under the direction of C. V. Hacker and his staff.

The visit was well timed and the 47 members present were able to see the two largest furnaces tapped and also re-charged. After the visit the party was entertained with light refreshments provided by the company. Over 80 were in attendance at the early meeting.

New Non-Porous Copper Plate Used as Nitriding Stop-Off

Reported by H. P. Henderson
Supervisor of Plant Layout, New Departure Div., G.M.C.

Certain specific facts were set forth by Carl F. Floe, associate professor of physical metallurgy at Massachusetts Institute of Technology, and assistant technical director of Nitralloy Corp., in his talk on "Nitriding and Its Industrial Application" before the October meeting of the Hartford Chapter A. S. M. These facts are as follows:

1. A white layer is first produced having a thickness of from 0.001 to 0.002 in. in depth, depending upon the ammonia concentration in the nitriding gas.
2. The total case is a function of the rate of transfer of nitrogen through the white layer.
3. The amount and nature of the alloying elements present governs the time necessary to produce the desired case.
4. Above 975° F. the size of precipitated nitride particles increases at the expense of hardness.
5. Fresh NH_3 must be provided to all surfaces at all times with good circulation, made possible by proper furnace design.
6. Steels should be properly prepared, free from decarburization, in a sorbitic condition, and stress relieved before nitriding.
7. Provision should be made in stock allowances for growth during nitriding plus that required to remove the white layer.

Dr. Floe touched on protective plating for selective nitriding, pointing out that tin is often used, but since it melts at nitriding temperatures, the plate must be controlled. New non-porous copper plate is used as well as nickel and bronze plating.

He also explained that parts highly stressed and later ground may have their stress distribution upset, causing dimensional changes in time. Retempering if possible can help this condition.

Springfield Chapter Has "Officers' Night"

Reported by R. R. La Pelle
Manager, Special Furnace Division, Dempsey Industrial Furnace Corp.

The development, heat treatment and use of aluminum and its strong alloys both fabricated and cast was discussed in a clear and interesting manner by National President Kent R. Van Horn at "National Officers' Night" of the Springfield Chapter Nov. 13.

Prior to Dr. Van Horn's talk, National Secretary W. H. Eisenman gave the members a bird's-eye view of the doings of the national society, and the prospects for the future—not to mention some highlights of the troubles of absentee owners of farm property.

Dayton Chapter Hears Babcock on Salt Baths

Reported by T. E. Hamilton
Metallurgist, Delco Products Division, G. M. C.

The November meeting of the Dayton Chapter featured a highly interesting and informative talk on "Salt Bath Furnaces and Salt Bath Treatment," by H. J. Babcock of the Ajax Electric Co. (Mr. Babcock's talk has been presented before other chapters of the Society and is reviewed on page 8.—Ed.)

Sleeve Bearings Are Made Thinner for Better Fatigue Life

Reported by E. W. Palmer
Technical Dept., American Brass Co.

"The Trend in Sleeve Type Bearings," a talk by John K. Anthony, chief chemist of the Cleveland Graphite Bronze Co., before the New Haven Chapter on Oct. 26, dealt chiefly with automotive and aircraft type bearings.

Mr. Anthony pointed out that the fairly thick bearings in use up to a few years ago customarily failed by a type of fatigue in which fine surface cracks developed in a radial direction until they almost reached the backing material, and then turned at right angles to continue a course parallel to the axis of the bearing. After a great deal of study it was found that if the bearing were made thin enough its fatigue life was enormously increased, and today bearings only 0.002 to 0.004 in. in thickness are in use, instead of the 0.035-in. or thicker types previously used.

Prior to the war, the bearing materials in common use were tin-base babbitts, lead-base alloys of various kinds, copper-lead alloys, cadmium-nickel and cadmium-silver alloys.

Mr. Anthony pointed out that the cadmium-silver alloy is unique in being a solid solution, and has excellent bearing properties despite the fact that previous theory postulated the necessity of having a hard constituent imbedded in a soft matrix. Experiences with pure silver as a bearing material also tended to disprove the matrix theory.

The current theory of bearing behavior considers fatigue resistance and lubrication characteristics of the greatest importance, with little regard for structure. If the bearing is properly engineered, the most important factor in performance is the fatigue resistance of the bearing material.

Recent trends in sleeve bearings have had to do with the use of very thin layers of the bearing material, and the development of new alloys. More or less standard in aircraft engines is the silver-lead-indium bearing in which a heavy, fine-grained deposit of silver is plated on a steel back to secure a good bond. A film of lead approximately 0.001 in. thick is then plated on the silver and a small amount of indium plated on the lead. After a diffusion treatment to alloy the indium with the lead, the bearing is ready for service and has given very satisfactory performance.

Another development has been the use of a lead-tin alloy plated as such on either a silver or copper-lead bearing layer. This also makes a very satisfactory bearing.

While silver is the best base material from a load-bearing standpoint, and is highly successful in aircraft use where dust is carefully excluded from the engine, in automotive use the indium-lead layer may wear through, and consequently a copper-lead base, which has much better bearing properties than silver, is widely used. The most recent development has been the substitution of tin-lead for indium-lead as the actual surface of the bearing.

Thomas Swinden, Famed in British Metallurgical Field, Dies Suddenly

Thomas Swinden, director of research, United Steel Companies, Ltd., Sheffield, England, who died suddenly on Oct. 27, was an internationally famed researcher in the field of metallurgy. Following his early pioneer work on molybdenum and tungsten steels, Dr. Swinden wrote many technical papers, which earned him such distinctions as the Bessemer Gold Medal of the Iron and Steel Institute, the M. C. James Gold Medal of the North East Coast Institution of Engineers and Shipbuilders, and the Silver Medal of the Institution of Marine Engineers.

T. Swinden

He was a vice-president of the British Iron and Steel Institute, and chairman of its Heterogeneity of Steel Ingots Committee, Corrosion Committee, Oxygen Subcommittee, Alloy Steels Research Committee, and Physical Chemistry of Steelmaking Committee. His other technical and committee activities, far too numerous to list, included a long-time membership in the American Society for Metals. During the war years, he had expended much time and energy in the work of the British Ministry of Supply and other governmental committees.

SILVER ANNIVERSARIES OF FOUR CHAPTERS

Hartford Chapter—November 14

Past chairmen and honored guests at the silver anniversary meeting of the Hartford Chapter were (left to right): L. H. Knapp (1933-34), *J. G. Cerina* (1943-44), *K. R. Van Horn, national president; D. A. Nemser* (1927-28), *D. W. Fryback, present chairman; F. P. Gilligan, first chairman and second national president* (1922); *J. C. Kielman* (1928-29), *W. E. Bancroft* (1941-42), *W. H. Eisenman, national secretary; A. H. D'Arcambal* (1922-23) *and past national president* (1932); *C. T. Hewitt* (1938-39), *R. J. Haigis* (1942-43), *W. H. C. Berg* (1936-37), *R. W. Woodward* (1926-27). *Photo by Hartford Courant.*

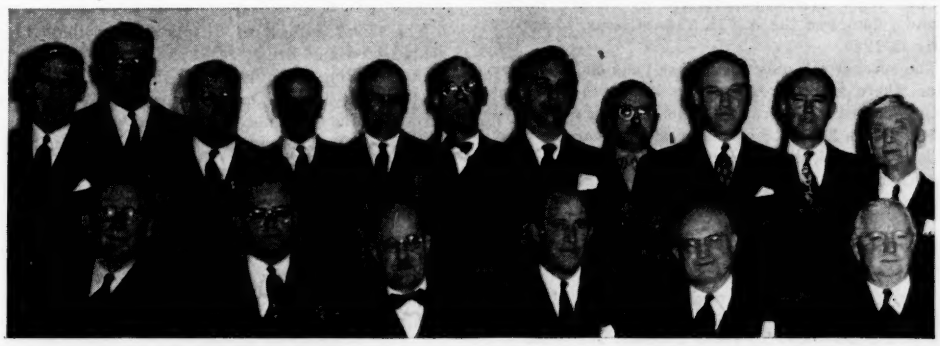
Reported by F. J. Wolfer
Metallurgist, the American Hardware Corp.

The Hartford Chapter of the American Society for Metals, in celebrating its silver anniversary meeting on Nov. 14, paid honor to the national president and secretary and to its past chairmen and past national presidents.

At the dinner all the honored guests were introduced and Carl Hewitt gave a brief resume of the Chapter's history. The original meeting was held on Jan. 28, 1919, and the first technical session on Feb. 21.

At the technical session, National Secretary Eisenman congratulated the officers and members and spoke briefly on affairs of the Society. F. P. Gilligan, the Chapter's first chairman and also the Society's second president, introduced President Kent R. Van Horn, who gave his talk on the metallurgy of aluminum.

Tri-City Chapter—November 21



Reported by A. H. Rauch
Deere & Co.

Sixteen past chairmen helped celebrate the 25th anniversary of the founding of the Tri-City Chapter A.S.M. on Nov. 21 at a dinner meeting attended by approximately 100 members.

H. Bornstein traced the history of the Chapter from its beginning on Nov. 21, 1919 at a meeting attended by 30 persons at the Commercial Club, Davenport, Iowa. Mr. Bornstein called attention to the tremendous progress made in metallurgy in the past quarter-century.

National President Kent R. Van Horn and Secretary W. H. Eisenman helped the Chapter celebrate the anniversary. Dr. Van Horn presented the technical address of the evening on "Metallurgy of Aluminum Alloys."

Past chairmen of the Tri-City Chapter who attended the 25th anniversary meeting are: Front row, left to right—C. U. Scott, first chairman of the chapter; G. Olson, Jr., A. H. Putnam, J. F. Lardner, H. Bornstein, H. Brown. Back row, standing—C. H. Burgston, John Hoffman, C. E. Scherer, J. D. Graham, E. H. Sohner, G. F. Jontz, G. A. Uhlmeyer, Lt. Col. P. C. Cunnick, R. Lind, F. C. Ewert (present chairman), and John Fielding.

War's Demand for Plate Met By Converting Four-High Strip Mills

Reported by E. J. Pavesic
Studebaker Aviation Division

Steel rolling was the subject of the October meeting of the Fort Wayne Chapter, ably presented by F. H. Allison, Jr., metallurgist of the United Engineering and Foundry Co., Pittsburgh.

Dr. Allison pointed out that this country was fortunate in having twice as many continuous strip mills as the entire rest of the world when we first started war production and the demand for steel plate to make tanks and ships increased. This demand was met, not by the construction of new plate mills, which would have consumed months of time, but by converting many of the four-high strip mills into plate mills by taking lighter drafts and not using some of the stands at all, finishing the metal in thicker gages.

If it were not for the process of rolling, our civilization would be much poorer, for it is difficult to conceive how the rails, beams, concrete bars, plate and a host of other steel products which are at the base of most of our luxuries and necessities could be formed with less effort and in such great quantity.

Midwest Research Institute Sponsors Technical Projects

Reported by Glenn S. Young
Kansas City Power & Light Co.

The purpose and operation of the Midwest Research Institute, a regional undertaking comprising the states of Arkansas, Iowa, Kansas, Missouri, Nebraska and Oklahoma, was explained by W. T. Rinehart, director, at the regular meeting of the Kansas City Chapter of the A.S.M. on Oct. 25. Dr. Rinehart stated that the primary purpose of the Institute is to supplement existing organizations of a similar nature in the study and development of natural resources in the region.

The Midwest Research Institute is patterned after the Armour Research Foundation of Chicago, and Harold Vagtborg, Armour Director, was employed to serve as advisor and consultant during the establishment of the new institute. It was with his approval that Dr. Rinehart was given a leave of absence to act as director of the Midwest Research Institute.

Dr. Rinehart explained in detail and by specific example how a project could be sponsored. Eventually, he said, the Institute will cover the fields of agriculture, chemistry, physics, metallurgy, mineralogy, bacteriology and all branches of engineering.

Dr. Rinehart was very enthusiastic about the possibilities of this area, and pointed out that the Institute should be of particular interest to technical men. The Institute will welcome suggestions from them and in turn wants to be of service along technical lines.

St. Louis Chapter—November 17

Reported by S. B. Knutson
Senior Metallurgist, Standard Steel Spring Co.

The 25th anniversary of the St. Louis Chapter of the American Society for Metals was celebrated on Nov. 17 with a program cleverly arranged by Rex Deghuee to blend the civic with the technical aspects of the Society. In attendance as guests were representatives of the associated technical societies, the city administration and some of the local sports celebrities.

The celebration was started off with an unusually fine dinner, followed by drawings for attendance prizes consisting of ten silver dollars mounted in lucite. Secretary Knutson then outlined the growth of the Chapter from the original 36 members at the organization dinner 25 years ago to the present membership of 250.

John Holland, representing the office of the Mayor of St. Louis, delivered a message of gratitude and appreciation for the contributions of the metals profession to the progress of the city.

This was followed by the feature speech of the evening presented by W. P. Woodside, national founder member, who gave a fascinating, authentic and beautifully laid out historical review of the origin and progress of the American Society for Metals. Mr. Woodside went back to the turn of the century and related some of the incidents that occurred during the birth and infancy of the automotive industry, cleverly blending the technical with the commercial and civic aspects of the Society's functions and history.

Mr. Woodside's talk was followed by ceremonies paying tribute to the nine remaining and available founder members. Those presented and introduced to the Chapter were C. B. Swander, Calvin P. Bascom, E. C. Hanpeter, F. Guy White, Alan Jackman, P. E. Chapman, F. E. Schwentler and Fred Oches.

To round out the program Col R. W. Coward, representing the St. Louis Ordnance District, gave a "straight from the shoulder" talk on ordnance and civic responsibility in wartime. To taper off, refreshments were served followed by a movie on "Electronics" by Westinghouse Electric and Mfg. Co. The real success of the evening was best illustrated by the obvious enjoyment of all present.

Indianapolis Chapter—November 20

Above: National Secretary W. H. Eisenman (left) helps Past Chapter Chairman W. R. Chapin cut the 25th anniversary birthday cake of the Indianapolis Chapter, while R. W. Stahl, chapter secretary, and J. G. Worthington, chairman of the Silver Anniversary Committee, look on. Below are shown, left to right, A. F. Gallistel, Jr., toastmaster, T. G. Harvey, present chapter chairman, and Kent R. Van Horn, A.S.M. national president, who spoke on "War Achievement of the Light Alloy Industry and Post-War Possibilities". Approximately 550 members attended the celebration.

Hercules Electric Opens New Plant

The Hercules Electric and Mfg. Corp., manufacturers of welders and other electrical equipment, announce the occupation of a new plant and offices at 2500 Atlantic Ave., Brooklyn, N. Y.

Rapid Flame Heating Uses Radiant Burners Or Combustion Nozzle

Reported by J. M. Redinger, Jr.
General Manager, Thurston Mfg. Co.

Rapid flame heating techniques for brazing and hardening metals have made possible the economical production of a wide range of parts requiring the application of heat in definite patterns, at definite rates, and to definite temperatures, James B. Henwood, development engineer, Selas Corp. of America, told the Rhode Island Chapter of the A.S.M. at its regular meeting on Nov. 1. The accomplishment of these heating effects is primarily dependent upon a completely integrated combustion system, the design of which is planned to take full advantage of the excellent combustion characteristics of gaseous fuels.

Mr. Henwood described the combustion system, consisting of a combustion controller, a fire check, and a burner or system of burners.

The burners principally involved in these rapid heating techniques consist of two distinct types, both, however, utilizing the beneficial effects on combustion rates of accurately formed ceramic shapes maintained at high temperature in close proximity to the combustible mixture. One is in effect a continuous, high temperature, internal combustion nozzle, which delivers a stream of 3100° F. products of combustion at a theoretical velocity of approximately 1000 ft. per sec. from the nozzle outlet. The nozzle is part of the combustion chamber and is constructed in circular, rectangular, "S", "U", or annular cross-sectional shapes, depending on the contour of the workpiece.

In the second type, known as the radiant burner, the combustible mixture is admitted radially along the surface of a ceramic cup from an accurately molded ceramic distributor tip located at the center of the base of the cup. Essentially complete combustion is obtained at the surface of the cup resulting in a high temperature surface capable of emitting heat radiation. Unlike the combustion nozzle or so-called "superheat burner" just described, localization of heat input is not obtained to the same degree but a uniform, incandescent radiating surface is produced which can be maintained at any temperature from approximately 1300 to 3100° F.

The heating up time of these burners is insignificant, and both have been designed with an aim toward obtaining complete combustion within the burners and not in the space between burners and work-piece.

Rapid heating of an entire object is usually accomplished by an envelope of radiant burners while selective heating of definite small areas to controlled depths is more often accomplished with the superheat burner. This flexibility of application makes it possible to attain many desired results, whether it be hardening, tempering, stress relieving, annealing, heating for forging or rolling, or brazing.

Mechanized heating processes must become a part of the production line and must be of comparable speed to other machine tools in order to produce at maximum efficiency for post-war industry, Mr. Kenwood concluded.

Muncie Chapter Plans to Enroll Libraries and Public High Schools

Reported by Herman P. Abel
Delco-Remy Div., G. M. C.

Leonard Grimshaw and Ray Kells of the Latrobe Electric Steel Co. addressed the Muncie Chapter on Nov. 8 on the subject of tool steels and high speed steels. Their discussions have been reviewed in previous issues of THE METALS REVIEW.

Earlier in the meeting Chairman Rea Hahn presented to the Chapter the ideas which were discussed at a meeting of the chapter chairmen during the National Metal Congress in Cleveland. These items included enrolling of the public library as a member of the Society, so that a complete reference library could be established for the Chapter. Enrollment of the leading public high schools in the area as members of the Society was also recommended.

Patent Granted for "Stressproof" Steels

La Salle Steel Co., Chicago, has announced the granting of U. S. Patent 2,320,040 covering such steels as are sold under the trade name "Stressproof". This new method of cold finished steel bar production consists of a combination of cold finishing and thermal treatments to obtain uniform and dependable strength and straightness.

Speakers and Guest Table, Washington Chapter

Reading from left to right are G. B. Waterhouse, past national A.S.M. president; R. Walter Dietrich, past chapter chairman; Carl A. Zapffe, technical speaker; T. E. Hamill, meetings chairman; C. E. Jackson, past chapter chairman; T. L. Stivers, present chairman; T. Digges, vice-chairman; Capt. Gerald D. Linke of the Navy Bureau of Ordnance, coffee speaker; and J. A. Bennett, chapter secretary.

Zapffe Describes Recent Research On Fractography, Hydrogen Embrittlement

Reported by George G. Luther
Naval Research Laboratory

Recent research on "fractography" and on hydrogen embrittlement of wire in acid and cathodic baths was introduced by Carl A. Zapffe, assistant technical director, Rustless Iron and Steel Corp., into his talk on "Gases in Metals" presented before the opening meeting of the Washington Chapter on Oct. 9.

Fractography is the name Dr. Zapffe has applied to the technique of studying untouched cleavage facets at high magnification, and was described in detail in two papers he presented before a crowded A.S.M. technical session during the National Metal Congress in Cleveland. These papers will be printed in the bound volumes of the A.S.M. *Transactions*, to appear early in 1945.

The speaker also described some tests on high alloy wire where embrittlement from hydrogen that had been absorbed during cathodic pickling was completely eliminated in 20 min. by passing steam over the wire. This was particularly interesting since it required from 5 to 6 hours to eliminate embrittlement at the same temperature of heating without the use of steam.

Dr. Zapffe's lecture was preceded by an amusing coffee talk by Capt. Gerald D. Linke, Navy Department, Bureau of Ordnance.

Select Magnaflux Method for Proper Sensitivity—Thomas

Reported by Carl H. Muehlemeyer
Metallurgist, O. T. Muehlemeyer Heat Treating Co.

Fundamentals and methods of application of the magnetic particle inspection methods were reviewed by W. E. Thomas, second vice-president of Magnaflux Corp., before the Rockford Chapter on Oct. 25.

Selection of the proper method of inspection is based upon selection of d.c. or a.c. current, current density, wet or dry particles, and continuous or residual application. Mr. Thomas pointed out that correct combinations of these elements will often result in excellent selectivity of the particular defect being sought.

For instance, the use of alternating current is desirable in making periodic Magnaflux inspection for fatigue cracks in aircraft engine parts. Here the "skin effect" of alternating current tends to show none of the deep sub-surface defects, particularly when low current density and the residual method are employed. Since fatigue cracks originate at the surface, the use of alternating current for magnetization will develop Magnaflux indications of all of these fatigue cracks very readily but deep seated sub-surface defects will not be located. The particular advantage in this choice of method is in the elimination of indications caused by relatively deep seated, non-metallic inclusions, which seldom have any effect on the service life of the part.

In all applications Mr. Thomas emphasized the desirability of using only enough sensitivity to reveal the defects for which rejections should be made and not to attempt to show all defects. The former arrangement relieves the operator or inspector of unnecessary responsibility, is less confusing, and cheaper.

Kennametal Names Burgoon Detroit Manager

Kennametal, Inc., of Latrobe, Pa., has announced the removal of its Detroit branch to larger offices at 5531 Woodward Ave. Bennett Burgoon, Jr., for several years the Kennametal representative at Rockford, Ill., has been made district manager in charge of the Detroit office.

Use of Carbide Tools and Negative Rake Angles Factors In Increased Milling Speeds

Reported by F. P. Kristufek
U. S. Steel Corp. Research Laboratory

The "live" subject of "High Speed Milling," presented by Hans Ernst, research director of the Cincinnati Milling Machine Co., at the Oct. 16th meeting of the New Jersey Chapter, was also of special interest to a large number of members of the American Society of Tool Engineers, who had been invited to attend.

Dr. Ernst named the utilization of sintered carbide cutting tools and negative rake angles as the two factors contributing to increased milling speeds. Recent metal cutting research indicates that negative rake angles are superior to positive rake angles at high cutting speeds but are of little use in milling light, ductile alloys with the possible exception of those of an abrasive nature.

The advantages of increased cutting speeds, as enumerated by the speaker, are increased production, improved finish, and less heat distortion of the work since most of the heat is carried off with the chips. Essential requirements for successful high speed cutting are milling machines of good construction, rigid work mountings, increased use of flywheels, and properly designed and carefully ground cutters.

Greater cutting speeds are possible with larger and more powerful machines but the speaker emphasized that we must explore further the possibilities of increasing production with existing standard milling machines before going to extremes in design.

Dr. Ernst concluded with the statement that the use of negative rake angles with carbide-tipped cutters and high speeds is not a fad of the moment but represents a real advance in milling procedure.

Use of Very Fine Metal Powders Introduces Problems in Production

Reported by Taylor Lyman
Department of Metallurgy, University of Notre Dame

"Fundamentals of Powder Metallurgy" opened the Notre Dame Chapter's technical program. Charles Hardy, president of the Hardy Metallurgical Co. of New York, discussed the preparation of metal powders and the means of using these raw materials. Mr. Hardy pointed out that the electrolytic method is capable of great flexibility since six or seven variables of electrolysis may be controlled to produce powders of widely different physical characteristics.

The recent use of powders of very small particle size—one micron or less—has introduced problems in the determination of particle size and apparent density as well as in the production of the powders. Further research is necessary to elucidate the influence upon the flow and compressing characteristics of blending these very fine powders with others of larger sizes.

Mr. Hardy's collection of pressed and sintered objects was examined with considerable interest by the members of the audience at the close of the meeting.

Appointments to A. S. M. Standing Committees Confirmed at Trustees' Meeting in November

At the meeting of the Board of Trustees of the American Society for Metals held Nov. 17, new appointments to the various national committees of the Society were announced by President Grossmann and confirmed by the Board. The complete personnel of the standing committees is listed below. The new appointments are shown in bold type and the numerals represent the date of expiration of membership.

Constitution and By-Laws Committee

J. W. Queen, Jr., J. T. Ryerson & Son, Inc., Jersey City, N. J., Chairman, '45
L. E. Ekholm, Alan Wood Steel Co., Conshohocken, Pa., '45
C. T. Evans, Jr., University Cyclops Steel Co., Titusville, Pa., '46
R. I. Hahn, Delco Remy Div., G.M.C., Anderson, Ind., '47
Melville D. Johnson, Caterpillar Tractor Co., Peoria, Ill., '47

Educational Committee

C. W. Mason, Cornell University, Ithaca, N. Y., Chairman, '45
Ray T. Bayless, A.S.M., Cleveland, Secretary
C. R. Austin, Penn State College, State College, Pa., '47
J. L. Bray, Purdue University, Lafayette, Ind., '45
O. W. Ellis, Ontario Research Foundation, Toronto, '45
J. O. Lord, Ohio State University, Columbus, Ohio, '46
W. D. McMillan, International Harvester Co., Chicago, '46
C. H. Shapiro, Reed Roller Bit Co., Houston, Texas, '46
C. G. Stephens, Glenn L. Martin Co., Baltimore, Md., '47

Finance Committee

H. D. McKinney, Driver-Harris Co., Harrison, N. J., Chairman (National Treasurer)
Glenn Coley, Detroit Edison Co., Detroit, '45
Zay Jeffries, General Electric Co., Cleveland, '47
N. P. Petersen, Canadian Acme Screw & Gear, Ltd., Toronto, '47
A. D. Potts, Simonds Saw & Steel Co., Lockport, N. Y., '45
G. E. Stoll, Bendix Aviation Corp., Notre Dame, Ind., '47
Kent R. Van Horn, Cleveland Consultant

Metal Progress Advisory Committee

Kent R. Van Horn, President A.S.M.
C. H. Herty, Jr., Vice-President A.S.M.
W. H. Eisenman, Secretary A.S.M.
Ray T. Bayless, Assistant Secretary A.S.M.
E. E. Thum, Editor, A.S.M., Cleveland
R. C. Dalzell, Revere Copper & Brass Co., Detroit, '45
H. L. Edsall, Ajax Metal Co., Philadelphia, '47
Zay Jeffries, General Electric Co., Cleveland, '47
C. D. King, United States Steel Corp., Pittsburgh, '45
C. H. Stevenson, Linberg Engineering Co., Chicago, '46
C. E. Swartz, Cleveland Graphite Bronze, Cleveland, '46
F. G. Tatnall, Baldwin-Southwark Div., Philadelphia, '46

Metallurgical Education Advisory Committee

R. F. Mehl, Carnegie Institute of Technology, Pittsburgh, Chairman
F. P. Gilligan, Henry Souther Engineering Co., Hartford
M. A. Grossmann, Carnegie-Illinois Steel Corp., Chicago
M. A. Hunter, Rensselaer Polytechnic Institute, Troy, N. Y.
J. L. Mauthe, Youngstown Sheet & Tube Co., Youngstown, Ohio
Bradley Soughton, Lehigh University, Bethlehem, Pa.
R. S. Williams, Mass. Inst. of Technology, Cambridge
R. E. Zimmerman, United States Steel Corp., Pittsburgh

Metals Handbook Committee

G. V. Luerssen, Carpenter Steel Co., Reading, Pa., Chairman, '45
J. Edward Donnellan, General Alloys Co., Boston, Secretary
A. J. Herzig, Climax Molybdenum Co., Detroit, '45
J. B. Johnson, Wright Field, Dayton, Ohio, '46
J. J. Kanter, Crane Co., Chicago, '46
A. L. Kaye, Carnegie-Illinois Steel Corp., Chicago, '45
C. H. Lorig, Battelle Memorial Institute, Columbus, '45
J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala., '45
H. W. McQuaid, Republic Steel Corp., Cleveland, '46
H. S. Rawdon, Bureau of Standards, Washington, D. C., '47
Lyall Zickrick, A.I.M.E. Representative
H. L. Maxwell, A.W.S. Representative
C. W. Obert, I.A.A. Representative

Publications Committee

Clair Upthegrove, University of Michigan, Ann Arbor, Mich., chairman, '45
Ray T. Bayless, A.S.M., Cleveland, Secretary
R. M. Brick, Yale University, New Haven, Conn., '45
R. E. Cramer, University of Illinois, Urbana, Ill., '46
Harrison Dixon, Sterling Alloys Co., Woburn, Mass., '47
Arthur E. Focke, Diamond Chain & Mfg. Co., Indianapolis, Ind., '45
W. R. Frazer, Union Twist Drill Co., Athol, Mass., '45
R. P. Koehring, Moraine Products Co., Dayton, Ohio, '47
R. W. Roush, Timken-Detroit Axle Co., Detroit, '46
A. O. Schaefer, Midvale Co., Nicetown, Philadelphia, '46
G. A. Sellers, Boeing Airplane Co., Wichita, Kansas, '47
Gordon Sproule, McGill University, Montreal, '47
R. L. Templin, Aluminum Co. of America, New Kensington, Pa., '47
T. S. Washburn, Inland Steel Co., East Chicago, Ind., '45
Stanley P. Watkins, Rustless Iron & Steel Corp., Baltimore, Md., '45
B. B. Wescott, Gulf Research & Development Corp., Pittsburgh, 46

Warren Celebrates National Officers' Night

Reported by W. T. Rubin
Metallurgist, Copperweld Steel Co.

The principles of "The Age Hardening of Metals" were interestingly described by Kent R. Van Horn, research metallurgist for the Aluminum Co. of America at the November meeting of the Warren Chapter, in celebration of National Officers' Night.

The coffee talker for the evening was Secretary Eisenman who advised the audience of the latest developments which had taken place on his farm.

Western Cartridge and Olin Corp. to Merge

An agreement of merger between Western Cartridge Co. and the Olin Corp., both of East Alton, Ill., will result in the formation of Olin Industries, Inc., as one of the nation's larger industrial enterprises. The proposed merger will bring under one unified management the 12 affiliates, subsidiaries and divisions of the two companies, according to John M. Olin, vice-president of both Western Cartridge Co. and the Olin Corp.

Corrosion Losses Are Magnified by War; Protection Explained

Reported by C. A. Nagler
University of Minnesota

Introducing his talk on "Protective Coatings" before the North West Chapter on Oct. 24, C. H. Sample of the Bell Telephone Laboratories pointed out that while normal losses due to corrosion are large during wars, the corrosion losses are magnified many fold as a result of the severity of the environment in and enroute to the tropical fields of operation in the current war.

The mechanism of the corrosion process was discussed and it was explained that corrosion is a chemical reaction between metals and non-metallic constituents of their environments which results in the formation of oxides, salts, hydroxides or mixtures of these compounds. The corroded state of most metals represents the most stable state.

It is generally accepted that corrosion can be combatted in two ways: (*a*) Provide a non-corrosive environment, or (*b*) provide a protective film or coating between environment and metal. The removal of dust and sulphurous gases from the atmosphere of telephone central offices, and the packaging of equipment in moisture-proof material are examples of the former.

Protective Films Either Natural or Applied

Protective films may be either naturally formed films or applied protective films or coatings. Natural films are superficial films of corrosion products. The type of film formed on any particular metal is influenced by the environment to which it is exposed. As an example, zinc acquires a protective film on its surface in rural or seacoast areas but the natural film is soluble in the acid atmospheres of industrial locations.

The fabricated or applied films used for corrosion protection may be classed as (*a*) metallic, (*b*) inorganic, (*c*) organic, and (*d*) surface conversion types. Mr. Sample discussed in detail only the metallic and surface conversion types. Zinc coatings are most commonly used for protecting ferrous materials. It is now common practice to give zinc coatings a supplemental treatment in an acidified dichromate solution. As an example, Mr. Sample cited the "Cronak" process—a patented process of the New Jersey Zinc Co. The protection derived from the dichromate treatment was explained on the basis of the presence of soluble chromates in the thin film which is formed on the surface of the zinc. The chromate film is adversely affected by heat.

In some recent applications zinc has been replaced by lead as a protective coating and tests tend to indicate that for certain environments the lead coats are superior to the zinc coating.

Mr. Sample presented a number of colored slides which showed the appearance of corrosion products in their natural color.

Industrial Gas Breakfast, National Metal Congress

William P. Woodside (inset at right), a founder member and past national president of the American Society for Metals, was one of the principal speakers at the Industrial Gas Breakfast of the National Metal Congress held in Cleveland last October.

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month

1. PRODUCTION OF METALS

1-137. Thermal Reduction of Alkaline-Earth-Metal Oxides. W. J. Kroll. *Light Metals*, v. 7, Oct. '44, pp. 465-466.

The earlier laboratory work which led, ultimately, to the evolution of practical commercial methods for the isolation of the alkaline-earth metals, in particular magnesium, by direct thermal reduction from their oxides. 18 ref.

1-138. Swedish Sponge Iron. Einer Ameen. *Iron & Steel*, v. 17, Oct. '44, pp. 637-642.

Theory, practice and economics of a direct reduction process.

1-139. Republic Builds for D. P. C. T. J. Ess. *Iron & Steel Engineer*, v. 21, Oct. '44, pp. R-18-R-67.

Geared to produce top quality steel from a wide range of materials, this new plant in Chicago is a fine example of modern steel plant design. Coke plant; blast, electric, and open-hearth furnaces, blooming mill.

1-140. The Three Kids Mine. *Mining Congress Journal*, v. 30, Oct. '44, pp. 44-45.

Leaching plant, built for the government by the Manganese Ore Co., employs chemical process not previously attempted on a large scale.

1-141. Zinc Recovery in the Holden Mill. *Mining World*, v. 6, Oct. '44, pp. 15-18.

Research devoted to the development of a suitable technique for recovering minute quantities of sphalerite in Holden ore has made Howe Sound's Washington operation third largest zinc producer in the state.

1-142. Maudina Tungsten. *Mining World*, v. 6, Oct. '44, pp. 30, 32.

New scheelite project near Oracle, Ariz., is generally regarded as the most significant tungsten development yet in the Southwest.

1-143. Control of the Acid Open Hearth by Means of Slag Fluidity Test. G. R. Fitterer. *Iron Age*, v. 154, Oct. 26, '44, pp. 62-64.

A search for the equilibrium which the acid open-hearth reputedly approaches.

1-144. Induction Furnace for Melting Aluminum. Manuel Tama. *Mechanical Engineering*, v. 66, Nov. '44, pp. 731-736.

Specific resistivity of molten metals; heat content of molten metals; history of induction furnaces; induction furnaces for melting aluminum; melting of aluminum in foundries; continuous melting and pouring; rolling mills; melting in sand-casting foundries; gas absorption; hard spots; production of hardeners or master alloys.

1-145. The Constitution of Some Basic Open-Hearth Slags. Brian Mason. *Blast Furnace & Steel Plant*, v. 32, Nov. '44, pp. 1328-1333.

Examination of thin sections; examination of polished sections; determination of the refractive indices of transparent phases in the finely powdered slag by the immersion method; identification of the phases present by their characteristic lines in an X-ray powder photograph. 6 ref.

1-146. An Experiment in Making Sponge Iron. Whitman E. Brown. *Engineering and Mining Journal*, v. 145, Nov. '44, pp. 83-86.

A product of fair grade (about 83% reduced) was made by the Bureau of Mines at the Madaras plant in Texas, but considerable alteration of the equipment would be necessary to determine optimum reduction and costs possible by the method used. The sponge iron was melted without difficulty in an acid electric furnace to make acceptable steel, except for high phosphorus content, which is dependent upon the ore used.

1-147. New Sintering Plant Affords Close Control of Product. John D. Knox. *Steel*, v. 115, Nov. 20, '44, pp. 120-121-123, 166.

New unit complete with car dumper, ore storage yard and railroad equipment at Ohio river plant produces 75 tons per hour. Raw materials are handled outside the sintering building. Auxiliary track hopper and skip provide ample supply of flue dust and coke breeze in bins. Sintering building well ventilated. Dust catchers minimize abrasion.

3. PROPERTIES OF ALLOYS

3-211. Distribution of Carbon Between Titanium and Iron in Steels. W. P. Fishel and Brison Robertson. *Metals Technology*, v. 11, Oct. '44, T. P. 1763.

The distribution of carbon between titanium and iron studied by measuring the relative amounts of iron carbide and titanium carbide present in a series of annealed steels in which the ratio of titanium to carbon extended from 0.527 to 4.61. 5 ref.

3-212. The Hardness of Silver-Antimony Solid Solutions. R. M. Treco and J. H. Frye, Jr. *Metals Technology*, v. 11, Oct. '44, T. P. 1769.

The relation between hardness and concentration in the silver-antimony system from very dilute to nearly saturated solutions of antimony in silver. 8 ref.

3-213. Substitute Solders of the 15-85 Tin-lead Type. J. B. Russell and J. O. Mack. *Metals Technology*, v. 11, Oct. '44. T. P. 1770.

Investigation to develop an alloy containing a maximum of 15% tin, with no cadmium or bismuth, having solder properties equivalent to or better than those of substitute solders now specified containing 18 to 20% tin or even approaching the properties of the standard 40 to 60 tin-lead solder. 25 ref.

3-214. Magnetic Materials. F. Brailsford. *Electronic Engineering*, v. 17, Oct. '44, pp. 192-195.

The magnetization process.

3-215. Mechanical Properties of Case-Hardened Materials. S. L. Gertsman and I. H. MacPherson. *Canadian Metals & Metallurgical Industries*, v. 7, Oct. '44, pp. 32-33.

Tensile strength and ductility of case determined from "case break point."

3-216. Properties and Uses of Aluminum and Magnesium Base Die Castings. J. C. Fox. *Aluminum & Magnesium*, v. 1, Oct. '44, pp. 28-29, 44-45.

Outstanding characteristics of aluminum die castings. The consumption of aluminum die castings has changed places with zinc alloy die castings, which were more than twice the consumption of aluminum before the war. Die casting alloys; silicon-aluminum alloy; copper-silicon type alloy; magnesium-aluminum type alloy; magnesium base alloy die castings; chemical composition; stability. 1 ref.

3-217. The Effect of Nickel and Iron on the Properties of a Wrought Aluminum-Copper-Magnesium Alloy. Maurice Cook and R. Chadwick. Institute of Metals *Journal*, v. 70, Sept. '44, pp. 423-433.

Small additions of either element delayed age hardening, and the maximum hardness after full aging decreased to an extent which depended upon the total iron plus nickel content, although when this exceeded about 1% further additions of either element were without effect. 3 ref.

3-218. Some Observations on the Mode of Occurrence of Selenium, Tellurium, and Bismuth in Copper. R. Eborall. Institute of Metals *Journal*, v. 70, Sept. '44, pp. 435-446.

Solid solubility of selenium and tellurium in phosphorus-deoxidized copper; the partial system Cu_2Se-Cu_2Te; X-ray examination of residues; modes of occurrence of bismuth; thermal analysis; microscopic examination. 15 ref.

3-219. Shot Peening and the Fatigue of Metals. H. F. Moore. *Iron Age*, v. 154, Nov. 2, '44, pp. 67-71, 136, 138, 140, 142.

Limitations of the process in offsetting various forms of structural damage. Explains the theory of shot peening and then proceeds to interpret test data. 9 ref.

3-220. Some Useful Wartime Developments in Whiteheart Malleable Iron. G. R. Webster. *Foundry Trade Journal*, v. 74, Oct. 12, '44, pp. 109-114.

The wearing properties and resistance to heavy loads of whiteheart malleable cast iron can be greatly improved by suitable hardening and, in some cases, a subsequent simple tempering operation.

3-221. The Magnetisation of Polycrystalline Iron and Iron-Silicon Alloys. G. C. Richer. Iron & Steel Institute Advance Copy, Sept. '44, 50 pp.

Survey of the competency of the domain theory to account for the observed characteristics of such material. Basic theory can provide reliable guidance for industrial effort but inherently significant disharmonies between theory and observation are common to laboratory single crystals and to commercial polycrystalline aggregates. A new method of analysis of the technical magnetisation curve.

3-222. Electron Diffraction Patterns of Copper-Gold Alloy. F. E. Haworth. *Bell Laboratories Record*, v. 22, Nov. '44, pp. 596-600.

Heating metallic alloys under controlled conditions to improve their properties.

3-223. Effect of Grain Size and Subzero Treatment on Productivity of Four High-Speed Steels. S. M. DePoy. American Society of Mechanical Engineers *Transactions*, v. 66. Nov. '44, pp. 645-648.

Results show that the grain size, carbide solution, and type of martensite formed in the tool have a very marked effect on its cutting ability. It appears that subzero treatment is much more effective, when large grain sizes are developed. 2 ref.

3-224. Machinability of Plain-Carbon, Alloy, and Austenitic (Nonmagnetic) Steels, and Its Relation to Yield-Stress Ratios When Tensile Strengths Are Similar. E. J. Janitzky. American Society of Mechanical Engineers *Transactions*, v. 66, Nov. '44, pp. 649-652.

It is possible by the use of yield-stress ratios of plain carbon, alloy, and austenitic (non-magnetic) steels of the same tensile strength to obtain an index of machinability for rough-turning. The relation between Taylor speed and yield-stress ratios of the same tensile strength is expressed mathematically.

3-225. Effect of Shot Peening on Fatigue Strength. H. F. Moore. *Machine Design*, v. 16, Nov. '44, pp. 145-150.

How shot peening strengthens (or, if unskillfully done, may weaken) a metal under repeated stress. Certain types of structural damage which may be done to structural and machine parts described. 10 ref.

3-226. Fatigue Resistance of NE Steel Shafts. O. J. Horger and T. V. Buckwalter. *Iron Age*, v. 154, Nov. 16, '44, pp. 60-63.

One of the drawbacks in the use of NE steels for highly stressed machine parts has been the lack of adequate data on their fatigue resistance. Described herein are the tests made on NE 8949, NE 8744 and NE 9445 steels as compared to SAE 4340. Endurance limit ratings are given these steels for various degrees of stress concentration.

3-227. Properties of Metals and Alloys at Sub-Zero Temperatures. J. W. Donaldson. *Metal Treatment*, v. 11, Autumn '44, pp. 161-170.

Mechanical properties of metals at sub-zero temperatures. 16 ref.

3-228. The Effect of Elements on the Mechanical Properties of Chromium-molybdenum Steel EI-84. V. M. Doronin. *Stal*, 1943, no. 1/2, pp. 39-41. *Alloy Metals Review*, v. 3, June '44, p. 1.

Experiments are reported on steels containing C 0.35 to 0.45%, Cr 0.60 to 0.90%, Ni 1.25 to 1.75%, Mo 0.15 to 0.25%, Si 0.17 to 0.37%, Mn 0.40 to 0.80%, P not more than 0.030% and S not more than 0.030%, oil hardened from 850° and annealed at 580 to 640°, then air cooled. C and Si increase the hardness of steel but decrease its toughness. This confirms some previously published results. Cr, Ni and Mn seem to have the same effect, but further studies disprove this. The tendency to develop annealing brittleness increases with increasing amounts of Cr, Ni and Mn; the annealing brittleness can be overcome by hastening the cooling after annealing. Heat resistance of these steels is affected by the following elements in decreasing order: P, C, Mo, Si, Cr, Ni. The effect of C is 40 times that of Ni, 6 times that of Mo and approximately 20 times that of Cr and Si. These steels should be annealed at 570 to 640°, the exact temperature depending on the carbon content and corrected for the other elements (graphs and table). These steels can be replaced by a steel containing Ni less than 0.50%, Mn 0.70 to 1.10%, Cr 0.75 to 1.05%, P less than 0.040% and S less than 0.04%, which can be made in open-hearth furnaces. It should be oil hardened from 830 to 900°, annealed at the proper temperature and cooled in oil or water.

3-229. Production of Flakeless Structural High-Alloyed Steel. A. A. Rastorguey and I. G. Arzamastsev, *Stal*, v. 3, no. 9/10, 1943, pp. 47-54. *Alloy Metals Review*, v. 3, June '44, p. 2.

It was observed in a large number of instances that flakes developed in steel even though the cooling period was long. The flakes developed after a considerable time and therefore passed the control testing. This condition occurred quite frequently in varieties of steels made in open hearths which formerly mere made in electric furnaces. The purpose of this investigation was to work out a method of cooling and annealing after rolling which would insure a flakeless steel and at the same time shorten the process. Both pearlitic and martensitic steels were investigated. To attain the two mentioned aims steels having a pearlitic transformation should be cooled slowly to somewhat below Ar. Steels having martensitic transformations should be treated similarly to below Ar". In either case, immediately after the cooling, the steel should be annealed. For martensitic steel cooled in soaking pits or gravel beds and then annealed in furnaces, 6 hr. may elapse between the two operations. In plants having furnaces for direct treating of steel, the latter is placed in such furnaces, kept at a temperature below Ar or Ar" and kept there long enough for the steel to go through the respective point. The steel is then transferred into a chamber kept at the annealing temperature, kept therein for the requisite time and then discharged into the air.

3-230. The Effect of Steam Used for Atomizing Liquid Fuel on the Formation of Flakes in Alloy Steel. G. P. Mikheev. *Teoriya Prakt. Met.* 1940, no. 11-12, 9-10; *Khim. Referat. Zhur.* v. 4, no. 7-8, 1941, p. 87. *Alloy Metals Review*, v. 3, June '44, p. 2.

The production of flakes in Cr-Ni steel containing C 0.2, Cr 1.0 and Ni 2.7% and in Cr-Mo steel containing Cr 1.15 and Mo 0.3% was studied. The flakes may be caused by the steam used for atomizing liquid fuel in the basic open-hearth furnace. Replacing the steam with air only during the boiling process did not prevent the formation of flakes. Changing the burners to air atomization facilitated the disappearance of flakes.

3-231. Cr-Mn-Ti and Si-Mn-Mo Structural Steel Trademarked 40KhGT and 40SGM. M. P. Braun. *Stal*, v. 3, no. 9/10, 1943, pp. 89-90. *Alloy Metals Review*, v. 3, June '44, p. 2.

The compositions of the two steels are C 0.40, 0.44; Si 0.36, 1.71; Mn 0.79, 1.24; Cr 1.73, 0.17; Ni 0.21, 0.22; Mo 0, 0.33; Ti 0.052, 0; S 0.025, 0.028; P 0.032, 0.039 respectively. The physical and mechanical properties of the steels are given.

3-232. Cr-Si-Mn-Mo Steel as Substitute for Highly Alloyed Cr-Ni-W Steels. M. P. Braun. *Stal*, no. 1-2, 1943, pp. 61-63. *Alloy Metals Review*, v. 3, June '44, p. 2.

A steel containing C 0.34, Si 1.05, Mn 6.93, Cr 16.25 and Mo 3.33% was investigated as substitute for Cr-Ni steels containing W and Mo. Tested at 900° the new steel compared well with Cr-Ni-W-Mo steels. Optimum results are obtained when the steel is oil hardened from 1100° to 1050°. It can be worked mechanically in a satisfactory manner after air hardening from 1000°. The coefficient of expansion in the interval 700 to 900° changes insignificantly. Photomicrographs, physical properties, etc., are given.

3-233. Hardenability and Interchangeability of Cast Steels. H. A. Schwartz. *Iron Age*, v. 154, Nov. 23, '44, pp. 42-46.

Equality of hardenability does not insure accurate or reliable predications as to other physical properties of cast steels. Basing steel substitutions on hardenability alone is a hazardous procedure.

4. STRUCTURE

4-43. The Apparent Microstructure Produced by Hydrofluoric Acid Etching Reagents on Pure Iron & Iron Silicon Alloys; "Barley-Shell" Markings. W. J. Wrazej. Paper for Iron & Steel Institute, April '44, *Engineers' Digest*, v. 1, Oct. '44, pp. 629-630.

Causes of markings.

5. POWDER METALLURGY

5-48. The Sintering of Metal Powders—Copper. C. J. Bier and J. F. O'Keefe. *Metals Technology*, v. 11, Oct. '44, T. P. 1765.

Three variables affecting the sintering process; namely, briquetting pressure, sintering temperature and time in hot zone. 5 ref.

5-49. Powder Metallurgy as Applied to Cemented Carbides. W. R. Jackson. *Canadian Mining & Metallurgical Bulletin*, no. 390, Oct. '44, pp. 393-414.

Manufacture of the powders; physical properties; application; brazing; grinding; design; suggestions for care of cemented carbide tools.

5-50. Filters Made of Porous Metal Can Be Fabricated in Special Shapes. Earl W. Reinsch. *Product Engineering*, v. 15, Nov. '44, pp. 769-771.

Material made from tiny metal spheres can now be produced to specified and controlled porosity. The material has already found numerous applications, including breathers, filters, flame arresters, and fluid meters. Details of the characteristics of the material and fabrication methods described.

6. CORROSION

6-55. Chromate Passivation of Zinc and Cadmium Surfaces. Frank Taylor. *Metallurgia*, v. 30, Sept. '44, pp. 275-276.
Many parts of service equipment possessing zinc or cadmium surfaces are given a passivation treatment to increase their resistance to corrosion. The method in which chromates are applied.

6-56. Corrosion of Yellow Brass Pipes in Domestic Hot-Water Systems—A Metallographic Study. E. P. Polushkin and Henry L. Shuldener. *Metals Technology*, v. 11, Oct. '44, T. P. 1742.
Microscopic examination of a series of brass pipes removed from apartment and office buildings. Brief history of the pipes, a description of their inside surface and microstructure, and a study of the effects of corrosion, with particular reference to the structural aspects of local and selective dezincification. 21 ref.

6-57. Cylinder-Bore Wear. *Automobile Engineer*, v. 34, Oct. '44, pp. 409-410.
An analysis of the factors causing corrosion.

6-58. Stress-Corrosion Tests of Bridge-Cable Wire. Rolla E. Pollard. *Journal of Research, National Bureau of Standards*, v. 33, Nov. '44, pp. 201-211.
Stress-corrosion cracks were produced in several statically stressed specimens of cold-drawn wire from the Portsmouth Bridge and in one specimen of heat treated wire from the Mt. Hope Bridge by immersion in dilute nitrate solutions. No cracks were produced in the cold-drawn Mt. Hope replacement wire after long exposure. 12 ref.

6-59. Practical Precautions for Preventing Concentration Cell Corrosion. *Steel*, v. 115, Nov. 13, '44, p. 136.
Observing several simple practices will avoid a rapid and destructive attack which takes place in crevices, beneath scale, and other deposits.

6-60. Corrosion of Stainless Steel in the Synthesis of Urea. A. I. Krasil'shchikov. *Korrozia i Bor'ba s Ne.*, v. 6, no. 5-6, 1940, pp. 26-31. *Khim. Referat. Zhur.*, v. 4, no. 7-8, 1941, pp. 132-3. *Alloy Metals Review*, v. 3, June '44, p. 2.
Under conditions of $(NH_2)_2$ CO synthesis the presence of excessive moisture in the mixture and an increase in the temperature of the mixture increases sharply the corrosion of steel EI-183 (Cr 18, Ni 8 and Mo 4%). Addition of excess NH_3 to the mixture retards the corrosion of this steel. NH_4CNO, which is always in equilibrium with $(NH_2)_2CO$ in the mixture, is considered to be the chief aggressive substance in the synthesis of $(NH_2)_2CO$. Test of various materials indicated that for lining the synthesis column the steel EI-183 is best. The pipes can be made of steel containing Cr 18%, Ni 14%, and Mo 4% and the intermediate part of the apparatus not exposed to high pressures can be made of Chromex. Addition of 0.3 to 0.5% of CuO to the charge decreased considerably the corrosion of steel EI-183.

7. PROTECTION

7-93. Anodic Treatment of the Aluminum Light Base Alloys. E. E. Halls. *Metallurgia*, v. 30, Sept. '44, pp. 271-273.
Recent studies in the U. S. S. R. towards more rapid processes.

7-94. An Investigation in the Surface Treating of Zinc Parts. J. E. Stareck. *Die Casting*, v. 2, Nov. '44, pp. 70-71.
Developments and investigations in the problem of treating zinc surfaces.

7-95. Metallizing in Aircraft Production. G. C. Close. *Modern Machine Shop*, v. 17, Nov. '44, pp. 194, 196, 198, 200, 205-206, 208, 210, 212, 214.
The metallizing process has provided an efficient and economical means of protection against corrosion and salt water spray on aircraft parts.

7-96. Metallizing Non-Conductors, III. Samuel Wein. *Metal Finishing*, v. 42, Nov. '44, pp. 669-672.
Silvering glass.

7-97. Electrolytic Finishes on Metal Improve Corrosion Resistance. E. L. Cableck. *Product Engineering*, v. 15, Nov. '44, pp. 754-755.
Advantages and limitations in production and service of anodic and plated finishes on fittings. Methods for production testing of anodized coatings.

7-98. Aluminum-Coated Sheet Steel Rates High in Corrosion Resistance. *Product Engineering*, v. 15, Nov. '44, pp. 762-765.
New coating process permits quantity production. Physical properties of the material, applications, and spot welding characteristics.

7-99. Aluminized Steel. *Aircraft Production*, v. 6, Oct., '44, pp. 505-506.
Properties and method of welding.

7-100. Galvanizing Fluxes. A. T. Baldwin. *Iron & Steel*, v. 17, Oct. '44, pp. 645-646.
The effects and properties of the various fluxes.

7-101. Electrotinning of Strip in the Alkaline Bath. T. G. Timby. *Steel*, v. 115, Nov. 6, '44, pp. 124, 127-128, 176.
Dull surface of electrotinned strip is changed to conventional bright finish by eddy currents induced in the base metal as it passes through heating coils carrying high-frequency current. High efficiency is obtained by operating plating bath at a temperature ranging from 190 to 200° F.

8. ELECTROPLATING

8-88. Flash Chrome Plating to Size. C. L. Tanner. *Mechanical Engineering*, v. 66, Nov. '44, pp. 726, 728.
Hard chrome plating; flash plating process; applications to cutting tools; flash chrome effective as gage finish.

8-89. A Sulfate-Chloride Solution for Iron Electroplating and Electroforming. R. M. Schaffert and Bruce W. Gonser. *Metal Finishing*, v. 42, Nov. '44, pp. 666-668, 678.
Applications.

8-90. Continuous Electro-Zinc Plating. J. Raymond Erbe. *Iron Age*, v. 154, Nov. 16, '44, pp. 70-72.
A brief discussion of some of the problems encountered in adapting various electrotinning units for continuous steel strip to electrolytic zinc plating of the strip.

8-91. Building Up Worn Parts by Electrodeposition. A. W. Hothersall. *Iron Age*, v. 154, Nov. 23, '44, pp. 47-51, 114.
Reviews some of the technical factors relating to electrodeposition in general and contrasts the relative advantages of nickel and chromium plating.

9. ELECTROMETALLURGY

9-21. Ore Treatment. Charles Hart. *Iron & Steel*, v. 17, Oct. '44, pp. 650-653.
Possibilities of electrometallurgical working in the U. S. A.

10. ANALYSIS

10-62. Determination of Copper in Aluminum and Magnesium Alloys. *Metallurgia*, v. 30, Sept. '44, p. 274.
Internal electrolysis without the use of a diaphragm to separate the anode and cathode compartments.

10-63. Amperometric Titration, II. J. T. Stock and M. A. Fill. *Metallurgia*, v. 30, Sept. '44, pp. 277-280.
Apparatus and general technique.

10-64. The Mass Spectrometer. E. D. Hart. *Electronic Engineering*, v. 17, Oct. '44, pp. 185-188.
A new electronic aid to analysis. 16 ref.

11. LABORATORY APPARATUS, INSTRUMENTS

11-110. Measuring and Designating Surface Finish. James A. Broadston. *Iron Age*, v. 154, Oct. 26, '44, pp. 76-81.
Measurements of surface roughness by the Profilometer and the Brush Analyzer. Novel use is made of the Amsler integrator to determine precise RMS values from profile curves produced by either the taper section photomicrograph or the Brush Analyzer record tape.

11-111. The Electron Microscope in Metallurgical Research. Charles S. Barrett. *Journal of Applied Physics*, v. 15, Oct. '44, pp. 691-696.
This review limited to metallographic studies with the electron microscope, in which the surface details of a polished and etched metal specimen are transferred to a replica and made visible in a transmission electron microscope. 7 ref.

11-112. Extending Microscopic Examination of Metals. F. Keller and A. H. Geisler. *Journal of Applied Physics*, v. 15, Oct. '44, pp. 696-704.
The electron microscope used to investigate the structure of aluminum and other alloys in a range far below the resolution of the light microscope. 11 ref.

11-113. The Thickness of Electron Microscopic Objects. Robley C. Williams and Ralph W. G. Wyckoff. *Journal of Applied Physics*, v. 15, Oct. '44, pp. 712-716.
Preliminary account of experiments made to determine the heights, or thicknesses, of certain objects under the electron microscope. Procedure for measuring heights based on shadow-casting developed. 8 ref.

11-114. The Relationship of "Rheology" to "Strength of Materials." A. C. Vivian. *Metallurgia*, v. 30, Sept. '44, pp. 237-240.
"Rheological" properties, flow properties, of all kinds of matter and materials.

11-115. The Metallographic Examination of Aluminum-Rich Alloys. N. H. Mason, G. J. Metcalfe and B. W. Mott. *Engineering*, v. 158, Oct. 13, '44, pp. 297-300.
The main equipment necessary for the preparation and microscopical examination of aluminum alloy specimens described, together with methods that have been found to give satisfactory results at the Royal Aircraft Establishment.

(*Continued on page 9*)

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the A.S.M. Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

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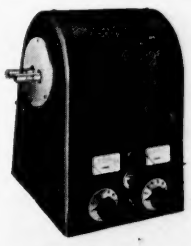

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M. R. Hyslop.....*Managing Editor*

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Volume XVII Number 12

Comment From the Press

on the National Metal Congress and Exposition

Miracles in Metals

If Adolph Hitler or the emperor of Japan were to visit Cleveland's Public Hall this week, they would understand why they are inevitably doomed to lose the war. For there, in the National Metal Exposition are gathered together the miraculous machines and processes devised by American engineers and metallurgists for the handling of steel and other metals. Machines on exhibition range from fine lathes to huge cranes.

The exposition is being held in connection with the National Metal Congress, sponsored by the American Society for Metals and four cooperating technical groups.

The foundation of modern civilization is furnished by the metals—the steel frameworks of skyscrapers, the steel plates of ships, the copper wires, the bronze pipes and the metals that serve special purposes of a hundred thousand varieties.

We are winning the war today because the metallurgists broke the bottlenecks of production by developing new types of steel alloys, new aluminum alloys, new processes for making magnesium, etc.

The experts gathered in Cleveland this week are thinking not only of the remaining days of the war but of the postwar period as well. They have new wonders in store for that period. Cleveland is honored by their presence.—*The Cleveland Press*, Oct. 14, 1944.

Mehl Discusses Hardness Theories And Brazilian Steel Industry

Reported by Sherman R. Lyle
Metallurgist, Timken Steel and Tube Co.

Discussing "Hardness of Metals" at the opening meeting of the Canton-Massillon Chapter on Oct. 12, R. F. Mehl, director of the Metals Research Laboratory of the Carnegie Institute of Technology, presented all the aspects of hardness in metals as developed in the past 20 years. The different theories and factors to which hardness in metals are attributed were developed and discussed. A discussion period led by Sidney Pool followed the talk.

Dr. Mehl also gave a short after-dinner talk on the iron and steel industries of Brazil, briefly telling of production methods, yearly output and steel requirements of the country.

Tool Engineers Move to New Quarters

The American Society of Tool Engineers has established its national office in the Penobscot Bldg., Detroit. The growth of the Society since its founding in 1932 until it now numbers more than 16,000 members has made this change from its present location necessary.

The new offices will also house the editorial staff for the *Tool Engineer*, official journal of the Society, which the Society, beginning with the February issue, will publish itself after ten years of having this work done by an outside contractor. A "Tool Engineers' Handbook" is also under preparation and should be off the presses in about 18 months, according to Adrian L. Potter, executive secretary of the Society.

Compliments

To WENDELL F. HESS, assistant professor of metallurgical engineering, Rensselaer Polytechnic Institute, and LT. DONALD C. HERRSCHAFT, base weather officer, Childress AAF, Childress, Texas, on the award of the Lincoln Medal of the American Welding Society, for their paper on spot welding of S.A.E. 1020, 1035 and 1045 steels.

* * *

To F. T. LLEWELLYN, retired, formerly director of research for the United States Steel Corp., on the award of the Samuel Wylie Miller Memorial Medal and Certificate of the A.S.M. for his contributions to the structural welding field.

* * *

To SUPERIOR TUBE CO., Norristown, Pa., on the celebration in November of a decade of growth and development.

* * *

To A.S.M. National President KENT R. VAN HORN on his new title in the Aluminum Co. of America—assistant manager of the Cleveland Research Division (formerly research metallurgist); also on his election as vice-president of the American Industrial Radium and X-Ray Society.

Salt Bath Heating Provides Uniformity and Flexibility

Reported by George F. Kappelt
Metallurgist, Bell Aircraft Corp.

It was not until the introduction of closely spaced pairs of electrodes located in a "heating zone" apart from the "work zone" of a salt bath, that the full advantages of this type of heating were made available. H. J. Babcock, Ajax Electric Co., explained with lantern slides to the October meeting of the Buffalo Chapter, how advantages such as uniformity of heating, elimination of atmosphere and high thermal capacity are achieved in salt bath heating.

Salts for heat treating purposes are now stocked as commercial items and resolve themselves into six working ranges: 300 to 1100° F., 800 to 1300° F., 900 to 1450° F., 1050 to 1750° F., 1300 to 1850° F., and 1800 to 2350° F. For carburizing, two types are sold —straight sodium cyanide salts and activated cyanide, the former being used to produce cases up to 0.010 in., and the latter up to 0.125 in.

Besides the advantages listed above, Mr. Babcock showed the flexibility that can be achieved by use of salt baths. The charging can be in unit pieces or complete charges, manually or automatically fed. He also emphasized the fact that localized overheating, which accompanies the hearth type but is entirely absent in salt bath treatment, is responsible for much of the distortion commonly encountered.

It was of particular interest to learn that salts at 468° F. have a greater cooling power than the best quenching oil at 68° F. This is the property utilized when salts are used as a quenching medium. Martempering, austempering, and cycle annealing were explained on the basis of the S-curve.

Mr. Babcock, however, emphasized that the maximum results obtainable from a salt bath quench cannot be expected unless the salt tank and fixtures are designed to make a truly isothermal quench. Such a quench involves adequate cooling of the bath as well as adequate movement of the salt in contact with the piece of metal being quenched. If the isothermal quench fails to dissipate the heat brought it by the metal quenched, and rises in temperature even as much as 10°, the effectiveness is destroyed.

V. W. Vaurio Now With Carnegie-Illinois

V. W. Vaurio, a past chairman of the Birmingham District Chapter A.S.M., and formerly with the research laboratory of Tennessee Coal, Iron and Railroad Co., is now with the research laboratory of Carnegie-Illinois Steel Corp. in Pittsburgh as development engineer, tin plate service.

Wickwire Spencer Moves Division Sales Offices

The general sales offices of the Springs and Formed Wire Division and of the Automotive Division of the Wickwire Spencer Steel Co. have been moved from New York to Worcester, Mass. The Morgan plant, where the products of these divisions are manufactured is also located at Worcester. A district sales office of these divisions will continue to be maintained in New York.

Statistical Sampling Is Often Better Than 100% Inspection

Reported by J. N. Lynn
Assistant Metallurgist, Rustless Iron and Steel Corp.

The timely subject of "Statistical Methods of Inspection" was interestingly presented by John Rutherford, inspection planning engineer of the Glenn L. Martin Co., to the first meeting of Baltimore Chapter's 1944-45 season. The three broad classes of control, the speaker said, are: (1) Acceptance of a lot based on sampling, (2) process control during manufacture, and (3) statistical methods applied to special problems.

The statistical methods were introduced with a discussion of the mathematics involved. The cost of sampling and cost of rejection of good lots can be correlated with the effect of sample size to give the complete cost of inspection. Because of human error and fatigue in highly repetitive 100% inspections, a statistical sampling method often gives better lot quality protection.

A practical application of statistical methods as used on the magnetic inspection of heat treated aircraft bolts was then discussed in detail. This study included a review of the records and tests, and consideration of the following factors: (1) The range of sizes of bolts; (2) sizes most frequently showing defects; (3) definition of a "lot"; (4) quantity received in typical lots; (5) packaging of bolts within the box and sampling techniques; (6) severity of defect found by routine inspection; (7) metallurgical features of the bolt; (8) evaluation of possible defects, considering the structural use of the bolt; and (9) relationship between the type of defect detected and the probability of its existence in manufacture.

Based on these factors, an inspection program was set up that assured that only one out of 79,000 bolts would have undesirable structural indications. The sampling program was used and the results checked against 100% inspection. After the inspection of 4,000,000 bolts the records showed that the sampling program gave assurance of one undesirable bolt in 128,000. This was considered far beyond human error, and the statistical method of sampling inspection was therefore installed, saving many inspection hours and assuring a quality product.

The advantages of process control in preventing defective work were pointed out and the principle of process control and typical control charts were shown. Statistical methods are used for interpretation of laboratory results and for the setting of logical standards. An adequate inspection program must include the use of intelligent standards and a thorough knowledge of production practices.

Named Assistant Research Director For American Steel & Wire Co.

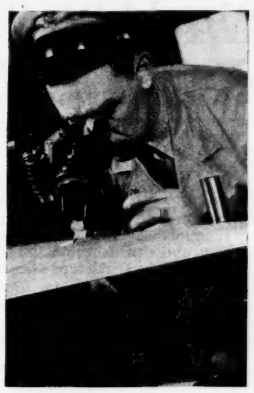
Willis T. Cramer has been named assistant director of research of the American Steel & Wire Co., succeeding Raleigh H. Barnes, deceased. Mr. Cramer has been promoted to his new position from the company's Cuyahoga Works where he has been works metallurgist since 1940.

W. T. Cramer

Mr. Cramer first began his association with American Steel & Wire when he became an assistant in the physical laboratory at Newburgh Works, following his graduation from Ohio State University in 1929. In 1936 he was made head of the Newburgh physical laboratory and later that year was transferred to Cuyahoga Works in Cleveland.

X-Ray Inc. Announces Additions to Staff

Arthur B. Stuart, president of X-Ray, Inc., has announced the appointment of George N. Stuart, Jr., formerly assistant to the works manager of the Western Cartridge Co., East Alton Plant, as general superintendent. X-Ray's enlarged staff now includes Maynard B. Evans, past national president of the American Industrial Radium and X-Ray Society, as secretary-treasurer and chief engineer; C. L. Darling, as field service engineer; Willard Johnson, formerly of Buhl Mfg. Co., as production engineer, and a number of trained X-Ray technicians. Mr. Stuart also announced the opening of a Chicago laboratory at 2532 So. Cottage Grove, and said that an additional branch in an eastern city is being considered.



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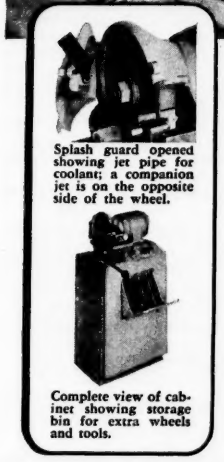

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Metal Literature Review

11. LABORATORY APPARATUS, INSTRUMENTS (*cont.*)

11-116. Reflected Light in Metallurgy—IV. E. Barber. *British Steelmaker*, v. 10, Oct. '44, pp. 436-439.
Choice of filters; mounting of specimens; the refractometer.

11-117. Lighting for Photo-Macrography of Aluminum Alloys. H. Chadwick. *Light Metals*, v. 7, Oct. '44, pp. 480-482.
Technical difficulties entailed in the photographing of large flat areas of metal which have been subjected to macro-etching. Experiments to determine a satisfactory lighting system for the purpose are described.

11-118. Supersonic Measurement of Metal Thickness. Wesley S. Erwin. *Iron Age*, v. 154, Nov. 9, '44, pp. 59-61.
High frequency sound waves have been utilized in the Sonigage to measure the thickness of metal sections where one of the surfaces is inaccessible. Instrument, first designed for inspection of hollow steel propeller blades, requires contact with only one surface of the object and little operating skill.

11-119. Metallographic Examination of Aluminum Alloys. *Canadian Metals & Metallurgical Industries*, v. 7, Oct. '44, pp. 40-41, 54.
Features of procedure adopted by Royal Aircraft establishments. 15 ref.

11-120. Are Your Controls Properly Designed, Effectively Placed? Harold Sizer. *Machine Design*, v. 16, Nov. '44, pp. 111-115.
Design and placement.

11-121. Electronics Sets Standard for Automatic Control. W. H. Gille and R. J. Kutzler. *Machine Design*, v. 16, Nov. '44, pp. 117-122.
Application of electronic control principles has made it possible to set new standards and to achieve full flexibility of control with completely automatic operation of all control functions.

11-122. A Method for the Measurement of Surface of Finely Divided Material. John W. Bell. *Canadian Mining & Metallurgical Bulletin*, no. 391, Nov. '44, pp. 424-436.
The essential features and general arrangement of the surface-meter.

11-123. Electronic Controls. Vin Zeluff. *Scientific American*, v. 171, Dec. '44, pp. 259-261.
Second-by-second measurements of gas content of air; constant supervision of rate of flow of liquid in a pipeline; and control of a specialized distillation system are only three examples of the possibilities of electronic control in everyday industrial operations.

11-124. Instrument for Measuring Short Time Intervals. *Journal of Scientific Instruments*, v. 21, no. 8, August '44, pp. 144-145. *Engineers' Digest*, v. 1, Oct. '44, pp. 613-614.
A large capacity condenser which has previously been charged by a high voltage d.c. supply, is discharged, during the time interval which it is proposed to measure, through a constant current circuit into a selected high-stability precision condenser.

12. TESTING, INSPECTION AND RADIOGRAPHY

12-284. The Application of Grain-Size Determination to Magnesium Alloys. C. H. Mahoney and A. L. Tarr. American Society for Testing Materials *Bulletin*, no. 130, Oct. '44, pp. 15-20.
Importance of a standard method for measuring grain size; proposed method of determination and recording of magnesium grain size.

12-285. Investigation of Graphitization of Piping. H. N. Boetcher. American Society for Testing Materials *Bulletin*, no. 130, Oct. '44, pp. 37-40.
Steels showing appreciable service graphitization had relatively large amounts of metallic aluminum (above 0.003%), but not necessarily much aluminum oxide. The effect of normality of the steel on susceptibility to graphitization is being kept in mind. All tests made so far showed the pipe steels to be abnormal, regardless of whether they graphitized in service or not.

12-286. How Filtering of X-Ray Beams Improves Radiograph Quality. Robert Taylor. *Aero Digest*, v. 47, Oct. 1, '44, pp. 88-89, 214.
The use of metallic filters offers a means for altering the radiation to meet the varying conditions imposed by different metals and alloys.

12-287. Determination of Surface Quality. *Light Metals*, v. 7, Oct. '44, pp. 497-505.
A new sensitive photo-electric method for the evaluation of surface finish. Results of the method are compared with those obtained by other techniques. 4 ref.

12-288. Steel for Irregular-Shaped Parts Selected on Basis of Hardenability. A. L. Boegehold. *Automotive Industries*, v. 91, Oct. 15, '44, pp. 18-21, 92, 94, 96, 98.
The determination of hardnesses throughout the part after quenching from the hardening temperature and substitution of cooling rates corresponding to those hardnesses picked from a hardenability curve for the same steel that was used to make the part.

12-289. 2-Million Volt X-Ray Tube. *Electronic Industries*, v. 3, Nov. '44, pp. 79, 226.
The development of a two-million volt sealed-off X-ray tube by the Machlett Laboratories, Springdale, Conn., for the first time makes it practical to radiograph thick metal sections by reducing the exposure time, for example, from a week with a million volt X-ray system to less than an hour.

12-290. Fluoroscopic Inspection of Light Metal Castings Used to Supplement Radiography. Robert Taylor. *American Foundryman*, v. 6, Nov. '44, pp. 6-9.
Discusses the process, its applications and its limitations, and describes available equipment for its industrial use.

12-291. Fatigue-Testing Methods and Equipment. H. W. Foster and Victor Seliger. *Mechanical Engineering*, v. 66, Nov. '44, pp. 719-725.
Design of fatigue testing apparatus, and the methods and equipment developed. 6 ref.

(*Continued on page* 10)

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Metal Literature Review

12. TESTING & INSPECTION (*cont.*)

12-292. **Radiography—Key to Better Casting Design.** *Foundry*, v. 72, Nov. '44, pp. 76-79.
Use of X-ray equipment as a development tool.

12-293. **Surface Roughness Standards for Tactual Comparisons.** James A. Broadston. *Product Engineering*, v. 15, Nov. '44, pp. 756-759.
Types of roughness standard specimens commercially available explained. New methods for specific designation of defined roughness limits are described with a recommendation that national standardization conform to defined values based on actual measurements.

12-294. **Selecting Steel on the Basis of Hardenability.** A. L. Boegehold. *Machine Design*, v. 16, Nov. '44, pp. 129-134, 166.
Correlation of hardness and strength; securing "full hardening"; determining acceptable hardness.

12-295. **Two-Million-Volt X-Ray Tube.** *Welding Engineer*, v. 29, Nov. '44, p. 51.
Precision X-ray tube.

12-296. **Shall We Qualify the Operator?** W. A. Pearl. *Welding Engineer*, v. 29, Nov. '44, pp. 52-53.
Test specifications; X-ray and tensile tests; ductility test; results.

12-297. **Integrated Inspection.** *Steel*, v. 115, Nov. 13, '44, pp. 131, 172.
Planned installations of X-ray units utilizing from 5000 to 1 million volts provide accurate, dependable examination of a great variety of material and insure flawless quality.

12-298. **Factors Influencing Exposure Times in the Radiography of Metals.** R. L. Durant. *Metal Treatment*, v. 11, Autumn '44, pp. 151-156, 160.
The use of experimentally determined exposure curves in a wide variety of conditions for the routine examination of metals by gamma radiography. Factors which influence the density of the exposed photographic film.

12-299. **Radiography for Development and Control of Aluminum Alloy Spot Welding.** G. W. Scott, L. G. Sutton and J. H. Widmyer. *Welding Journal*, v. 23, Nov. '44, pp. 560-s-570-s.
Determine the optimum procedure and equipment for rapid, routine spot-weld radiography of 24-ST Alclad and 61-SW alloys. Reveal and correlate with macrographs of cross sections many interesting and instructive structural features of welds in these alloys. Identify weld defects. Establish allowable limits for these radiographic defects in production welding that are commensurate with the known influence of the defects on weld strength and with normal factory operating conditions for preweld cleaning and spot welding.

12-300. **Tolerances and Their Effect on Physical Measurements.** Charles Darwin. *Engineers' Digest*, v. 1, Oct. '44, pp. 616-618.
Tolerances have become a respectable part not only of engineering practice, but also of fundamental science.

12-301. **Study of Internal Stresses in a Metal by X-ray Diffraction.** W. A. Wood. Paper for Institute of Mechanical Engineers, March 17, '44, *Engineers' Digest*, v. 1, Oct. '44, pp. 618-620.
Internal strain; X-ray method; stress-strain curve for the atomic lattice; stress determination.

12-302. **How to Improve Accuracy and Efficiency in Measurement and Testing of Gears.** K. Burger. *Maschinenbau der Betrieb*, v. 22, no. 3, March '43, pp. 101-107. *Engineers' Digest*, v. 1, Oct. '44, pp. 637-641.
Testing form of teeth; testing surface of flanks; testing circular pitch and chordal pitch; thickness and width of teeth, and width of space; parallelism of the teeth; testing with regard to collective defects.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-37. **Improved Control Through Use of Transparent Thermocouple Protecting Tubes.** J. P. Vollrath. *Industrial Heating*, v. 11, Oct. '44, pp. 1619-1620, 1708, 1710.
Vycor, a transparent glass of 96% silica, provides rapid response to temperature changes, facilitating extremely close temperature control. Results described.

13-38. **Operating the Continuous Furnace by Automatic Temperature Control.** *Industrial Heating*, v. 11, Oct. '44, pp. 1622, 1624, 1632.
The successful application of automatic control of any furnace requires three things: a good furnace of proper design, good burners, and good control equipment.

13-39. **Steelworks Pyrometry.** A Linford. *Iron & Steel*, v. 17, Oct. '44, pp. 632-636.
Principles and applications of radiation and optical instruments.

13-40. **Ratio and Multiple-Fuel Controls in the Steel Industry.** Herbert Ziebolz. American Society of Mechanical Engineers *Transactions*, v. 66, Nov. '44, pp. 705-721.
Methods used and the apparatus which were developed and discussed are: The basic ratio control, the control mixing stations, and the controls available for burning several fuels simultaneously with only one common supply for combustion air. 8 ref.

13-41. **Measurement of Casting-Stream Temperatures.** D. A. Oliver and T. Land. *Metal Treatment*, v. 11, Autumn '44, pp. 145-150, 144.
Investigations, employing a platinum/platinum-rhodium thermocouple method for measuring the true temperature of liquid steel casting streams.

Tlack Appointed by Latrobe Electric Steel Co.

Victor F. J. Tlack, pioneer developer of cobalt-chromium steels and tool steel jobbing executive, has been appointed consultant and special representative of the sales department of Latrobe Electric Steel Co. Mr. Tlack until recently served as president of Darwin & Milner, Inc., Cleveland, having been associated with that firm for almost 30 years. He will make his headquarters at Latrobe's Cleveland office.

Blast Furnace Developments Are Use of High Top Pressure, Steam in Blast, Carbon Bottom

Reported by Donald Sener
Harrisburg Steel Corp.

With 20 years of personal experience in blast furnace construction and operation, John Macdonald, assistant to general superintendent, Hanna Furnace Corp., Buffalo, was duly qualified to discuss his subject before the "Steelton" meeting of the York Chapter, held in Harrisburg on Nov. 8. Although the subject is not a new one, it was presented in such a clear and non-technical manner that from the viewpoint of both the neophyte and the blast furnace operator it served as a good introduction and refresher.

In his introduction Mr. Macdonald revealed that although blast furnace operations started back in the 15th century, the most startling improvements in the mechanical end of the process date from 1920.

Under the heading of new developments, Mr. Macdonald discussed the use of steam in the blast. This is the subject of much controversy in operation, but for basic furnace work it has great advantages.

Another new step is the use of a high top pressure,—*i.e.*, 12 lb. in comparison to a normal top pressure of 1 to 4 lb. This new practice shows promise in smoother operation and lower flue dust lost.

The use of a carbon bottom is also new and according to reports from the trade much has been gained from its use, either as a tamped or brick formation, under proper conditions of operation.

Almen On Residual Stresses, Burton On Metallizing Give "Double Feature"

Reported by H. P. Evans
Boeing Aircraft Co.

A "double feature" meeting of the Puget Sound Chapter in October started out with a description by Marshall Burton of the Metallizing Engineering Co., Inc., of outstanding applications and limitations of the metallizing process. Improved methods of surface preparation insure a much improved bond between the sprayed layer and the base metal, regardless of its composition.

J. O. Almen, head, mechanical engineering department, Research Laboratories Division, General Motors Corp., then gave a thought-provoking talk on "The Effect of Residual Stresses on the Strength of Metals," with special emphasis on the beneficial effect of surface peening on fatigue life. He stressed the point that the microstructure and static physical properties of a steel part do not tell the whole story as to the manner in which a part will function in service, particularly in fatigue.

Residual stresses, instead of weakening, may, if properly situated in the part, actually increase the fatigue life tremendously. The mechanism by which this occurs has been outlined in previous reports of Mr. Almen's talk when given before other chapters.

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Metal Literature Review

14. FOUNDRY PRACTICE AND APPLIANCES

14-368. **Developments in the Design and Use of Side-Blown Converter Plants.** P. C. Fassotte. *Metallurgia*, v. 30, Sept. '44, pp. 256-260.
Experiments on the relative importance of the silicon reaction; conclusions from experimental data; description and operation of the side-blown converter plant; physical properties of the steels obtained; credits and debits.

14-369. **The Side Feeding of Steel Castings.** B. Gray. *Metallurgia*, v. 30, Sept. '44, pp. 266-268.
The influence of the mechanism of freezing.

14-370. **Some Useful Wartime Developments in Whiteheart Malleable Iron.** G. R. Webster. *Foundry Trade Journal*, v. 74, Oct. 5, '44, pp. 87-91.
Foundry problems in the production of whiteheart malleable castings.

14-371. **Speed of Rotation in the Centrifugal Casting Process.** J. E. Hurst. *Foundry Trade Journal*, v. 74, Oct. 5, '44, pp. 95-99.
Review of conditions of rotational speed in various types of centrifugal casting processes. 13 ref.

14-372. **Metallurgy in the Non-Ferrous Foundry.** A. C. Boak. *Canadian Metals and Metallurgical Industries*, v. 7, Oct. '44, pp. 28-31.
Some fundamentals for successful castings. 3 ref.

14-373. **Equipment and Material for Precision Casting.** J. Albin. *Iron Age*, v. 154, Nov. 9, '44, pp. 52-58.
Products offered by manufacturers that have typical uses in precision casting by the "lost wax" process. Unpublished data on details of the technique.

14-374. **Speed of Rotation in the Centrifugal Casting Process.** J. E. Hurst. *Foundry Trade Journal*, v. 74, Oct. 12, '44, pp. 117-120.
Review of conditions of rotational speed in various types of centrifugal casting processes. 22 ref.

14-375. **Bench Coremaking Time Standards for Job Shops.** William A. Grede. *Foundry*, v. 72, Nov. '44, pp. 80, 208, 210.
Standards for bench coremaking set-up using time without fatigue allowances.

14-376. **Modern Foundry Architecture.** Mary Munro Smith. *Foundry*, v. 72, Nov. '44, pp. 86-87, 212, 214, 216.
Cast armor plant operated by the American Steel Foundries at East Chicago.

14-377. **Determination of Sprue Size in Aluminum Castings.** Cornelius Benkoe. *Foundry*, v. 72, Nov. '44, pp. 88, 184.
Chart for determining the correct size of downsprue.

14-378. **Chilled Iron Produced by Tellurium.** John S. Crout. *Foundry*, v. 72, Nov. '44, pp. 89, 218, 220.
Methods, difficulties, advantages, and uses. 2 ref.

14-379. **Patterns of Gypsum Cement.** E. H. Schleede. *Foundry*, v. 72, Nov. '44, pp. 90-91, 186, 188, 192, 196.
Methods of forming patterns of various shapes.

14-380. **Equipment and Material for Precision Casting.** J. Albin. *Iron Age*, v. 154, Nov. 16, '44, pp. 53-59.
Induction heating furnaces and centrifugal casting machines.

14-381. **Dry Foundry Ladles Through Eliminating Boiling Produce More Salable Castings.** C. E. Bales and F. McCarthy. *American Foundryman*, v. 6, Nov. '44, pp. 2-5.
Boiling in ladles, due to damp linings, is dangerous and detrimental to iron and steel. Emphasizes that ladles should be preheated to drive out the chemically combined water in refractory linings, and describes various methods of drying and preheating ladle linings.

14-382. **Some Useful Wartime Developments in Whiteheart Malleable Iron.** G. R. Webster. *Foundry Trade Journal*, v. 74, Oct. 19, '44, pp. 139-142.
Foundry problems in the production of whiteheart malleable castings.

14-383. **The Production of Gray Iron Castings in Metal Molds.** C. Englisch. *Die Giesserei*, v. 30, no. 16/17, August '46, pp. 181-189. *Engineers' Digest*, v. 1, Oct. '44, pp. 622-624.
The use of stationary molds.

15. SECONDARY METALS

15-30. **Use of Secondary Magnesium.** W. E. Martin. *Aluminum & Magnesium*, v. 1, Oct. '44, pp. 34-35.
Reclamation of magnesium scrap.

15-31. **Routine Inspection and Salvage of Defective Machinery Weldments.** James W. Owens. *Steel*, v. 115, Nov. 13, pp. 113-114, 116, 118, 120.
Important economic advantages are to be obtained from systematic inspection of parts and application of proven salvage procedures for reclaiming rejected work.

16. FURNACES AND FUELS

16-141. **Producer Gas for Small Heat-Treatment Furnaces and Other Processes.** *Metallurgia*, v. 30, Sept. '44, pp. 269-271.
The simplicity of the producer unit and its ease of operation are such that it can be confidently recommended as a permanent unit for providing a steady supply of gas for individual heat treatment processes or for a collection of small demands occurring at a distance from the central producer plant.

16-142. **First Report on the Basic Cupola by the Melting Furnaces Sub-Committee.** *Foundry Trade Journal*, v. 74, Sept. 28, '44, pp. 71-74.
Examination of results obtained in practice with basic-lined cupolas.

16-143. **The Heating of Open-Hearth Furnaces with Mixed Coke-Oven and Blast Furnace Gas.** R. W. Evans. *Blast Furnace & Steel Plant*, v. 32, Oct. '44, pp. 1205-1207.
Mixed-gas operation; mixed gases and dolomite consumption; metallurgical considerations.

Metal Literature Review—*Continued*

16-144. An "In-and-Out" Plate Mill Furnace With Two Twenty-One-Foot Door Openings. L. S. Longenecker. *Blast Furnace & Steel Plant*, v. 32, Oct. '44, pp. 1208-1212.
Door control mechanism; permits 60% increase in tonnage charged; uniform temperature throughout furnace; withstands heavy duty service.

16-145. Blast Furnace Moisture Control. John J. Alexander. *Blast Furnace & Steel Plant*, v. 32, Oct. '44, pp. 1213-1219.
Benefits derived from controlled moisture of the blast are sufficient to offset the costs to the furnaces.

16-146. Core Ovens in the Aircraft Engine Industry. H. E. Linsley. *Industrial Heating*, v. 11, Oct. '44, pp. 1717, 1718, 1720, 1722, 1724, 1726, 1730, 1732, 1734, 1738.
Description of the main ovens used for regular production.

16-147. Producer Gas. *Iron & Steel*, v. 17, Oct. '44, pp. 647-649.
For small heat treatment furnaces and other processes.

16-148. Automatic Manipulation of Open-Hearth Furnace Doors. C. C. Downie. *British Steelmaker*, v. 10, Oct. '44, pp. 440-442.
Advantages of the automatic system; the improved electrical device used.

16-149. Determination of the Profiles of Blast Furnaces. W. Goldsbrough and S. G. Throssell. *British Steelmaker*, v. 10, Oct. '44, pp. 443-453.
Profiles of some continental blast furnaces which are operating on very rich and easily smeltable burdens and an excellent quality of coke. The furnaces are hard driven and show specific performances outside the range of those already given for furnaces working under ordinary or less favorable conditions.

16-150. Gas Producers and Producer Gas. L. L. Swift. *Iron & Steel Engineer*, v. 21, Oct. '44, pp. 45-48.
Tight supplies of oil and gaseous fuels and sharp increases in their prices, has reawakened interest in gas producers. Developments in gas cleaning and in anthracite or coke producers have widened the field of producer gas application.

16-151. Modern Blast Furnace Design and Operation. James Dale. *West of Scotland Iron & Steel Institute Journal*, v. 51, pt. 4, pp. 45-106.
Developments of the American type of furnace.

16-152. Coke Properties and Cupola Melting. B. P. Mulcahy. *Foundry*, v. 72, Nov. '44, pp. 94-97, 222, 224, 226.
Influence on cupola operations of various physical and chemical properties of foundry coke. 2 ref.

16-153. Open Hearth Steelmakers Discuss Shop Problems. John D. Knox. *Steel*, v. 115, Nov. 13, '44, pp. 134-135.
Discussions are candid; special refractory applications; suited to endwall service; bottom performance; factors affecting cleanliness.

16-154. The Selection of Coals for Carbonization. B. P. Mulcahy. *Blast Furnace & Steel Plant*, v. 32, Nov. '44, pp. 1322-1327.
Various aspects of simple means for the certain identification of good or bad coals. 13 ref.

16-155. Purging Operations and Controls. Hugh E. Ferguson. *Blast Furnace and Steel Plant*, v. 32, Nov. '44, pp. 1334-1340, 1373.
Purging efficiency; factors affecting purging efficiency; taking holder out of service; purging out of service; purging holder into service; example of holder purging; purging of plant mains; control of main purging.

16-156. Furnaces for Salt Baths. Leon D. Slade. *Metal Progress*, v. 46, Nov. '44, pp. 1089-1090.
Advantages of metal containers vs. ceramic pots; transformer requirements; pyrometers.

16-157. Small Producer-Gas Heat Treatment Furnaces. *Metal Treatment*, v. 11, Autumn '44, pp. 157-160.
A small producer-gas plant, suitable for heat treatment and other processes, which was originally designed as a stand-by unit for firing furnaces whose normal operation might be interrupted by enemy action. Suitable as a permanent unit for providing a steady supply of gas for individual heat treatment processes located at a distance from the central producer plant.

16-158. High-Speed Heating of Heavy Metal Work. Carl H. Lekberg. *Industrial Gas*, v. 23, Nov. '44, pp. 9-10.
Air-gas combustion for the high-speed heating (to forging, extruding, annealing and hardening temperatures) of heavy metal work.

16-159. Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces. Wallace G. Imhoff. *Industrial Gas*, v. 23, Nov. '44, pp. 18-19, 31-33.
Galvanizing furnaces—coke fired.

17. REFRACTORIES AND FURNACE MATERIALS

17-69. Special Loading Fixtures Add to Furnace Capacity and Operating Economy. Paul Goetcheus. *Industrial Heating*, v. 11, Oct. '44, pp. 1639-1640, 1642, 1644, 1646.
Furnace parts, roller rails, conveyor rolls and chains, carburizing and annealing boxes, nitriding fixtures, dipping baskets, cyanide and lead pots—these are only a few of the locations where the use of heat resisting alloys has resulted in important economies and increased production.

17-70. The Design, Selection and Application of Alloy Pots for Liquid Heat-Treating Media. Harrison I. Dixon. *Industrial Heating*, v. 11, Oct. '44, pp. 1648, 1650, 1652-1654, 1658.
The alloy manufacturer should know the type of furnace, fuel, combustion conditions, type of work handled, and method of handling employed for a given process.

17-71. The Sillimanite Group of Minerals for High-Temperature Refractories, II. *Industrial Heating*, v. 11, Oct. '44, pp. 1699-1700.
The occurrence, properties and uses of the minerals kyanite, andalusite, sillimanite, and dumortierite, and the allied minerals topaz and pinite, in the manufacture of refractories that must withstand the high temperatures met with in modern processes.

17-72. The Basic-Lined Cupola. *Engineering*, v. 158, Oct. 6, '44, p. 265.
Linings, types, life, costs.

17-73. Permeable Refractories for Furnaces. D. C. Gunn. *Industrial Gas*, v. 23, Nov. '44, pp. 11, 28-29.
Fireclay insulating material which is burnt with carbonaceous material; on firing, the carbonaceous material burns out, and leaves a porous structure, resulting in a brick possessing low thermal conductivity and low thermal capacity.

18. HEAT TREATMENT

18-234. Nitriding High-Speed Steel Tools. *Machinery* (London), v. 65, Sept. 28, '44, p. 345.
Metallurgical and the practical application aspects.

18-235. The Cold-Treatment of High-Speed Cutting Tools. F. W. Whitcomb. *Machinery* (London), v. 65, Sept. 28, '44, pp. 350-351.
Procedure.

18-236. Small Producer Gas Plant for Heat Treatment and Other Processes. *British Steelmaker*, v. 10, Oct. '44, pp. 462-464.
Feature of a new producer is that it requires no special foundation work, concrete flumes or seals, nor extensive calls upon auxiliary services.

18-237. How Long is "Holding Time?" W. Trinks. *Industrial Heating*, v. 11, Oct. '44, pp. 1626, 1628, 1632.
Reasons for holding at temperature; effect of method of heating; suggested specification changes; practical example.

18-238. Methods and Equipment for Induction Heating. C. C. Levy. *Iron & Steel Engineer*, v. 21, Oct. '44, pp. 51-58.
Induction heating has made rapid strides particularly as a mass production machine tool.

18-239. Induction Heating. G. E. Shaad. *Iron & Steel*, v. 17, Oct. '44, pp. 663-666.
Advantages and possibilities of high frequency equipment for heat treatment.

18-240. Nitrogen Surface-Hardening. A. G. Arend. *Chemical Age*, v. 51, Oct. 7, '44, pp. 347-349.
Developments of ammonia processes.

18-241. Post-War Steel and Its Treatment. Harry W. McQuaid. *Metal Progress*, v. 46, Nov. '44, pp. 1067-1073.
Post-war technological picture as it affects those interested in the selection and heat treatment of steel.

18-242. Diagram of Transformation During Continuous Cooling of Steel (a Necessary Guide for Propeller Heat Treatment). C. A. Liedholm. *Metal Progress*, v. 46, Nov. '44, pp. 1096-B, 1097-1101.
A simple method of plotting these diagrams (similar in nature to the S-curves or TTT-curves for isothermal transformation except they record the occurrences during total quenches of any practicable velocity). Shows how the diagram has been invaluable in controlling the die quenching under internal pressure of hollow steel propeller blades.

18-243. Heat Treatment of Moderately Heavy Cast Steel Sections. K. L. Clark, H. F. Bishop and H. F. Taylor. *Foundry*, v. 72, Nov. '44, pp. 82-84.
Quenching and tempering treatments have advantageous possibilities for heavy castings of suitable design.

18-244. Heating of Steel in Controlled Atmospheres. Sam Tour. *Mechanical Engineering*, v. 66, Nov. '44, pp. 727-728.
Review of the development and status of the art of heating steel in controlled atmospheres traces the development for a period of approximately 30 years, beginning just prior to the first world war. The chronological arrangement is broken down into the periods of basic research, adaptation to practice, general acceptance and modern trends, and modern equipment. 15 ref.

18-245. Sub-Zero Treatment of Steels. H. C. Amtsberg. *Machine Tool Blue Book*, v. 40, Nov. '44, pp. 131-132, 134, 136, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158.
The fundamentals of cooling hardened steels to temperatures considerably below room temperature, properly correlated with the basic treatment cycle and related structural changes.

18-246. Controlled Atmospheres for Processing Metals. C. E. Peck. *Steel*, v. 115, Nov. 6, '44, pp. 114-116, 118, 144, 146, 148, 150, 153-154, 156, 158, 160, 162, 164.
The various types of controlled atmospheres, the equipment required for making them, and the applications for which they are best suited.

18-247. What Quenching Oil Not to Use. G. W. Pressell. *Iron Age*, v. 154, Nov. 9, '44, pp. 62-65.
Modern quenching oils, with the proper selection of base stock and subsequent fortifying with additions to secure oxidation stability and quenching speed. The results are predictable properties of treated steels, uniformly and regularly in mass production.

18-248. Flame Hardening Blanking Dies. Lin Mager. *Tool Engineer*, v. 14, Nov. '44, pp. 73-74.
Facilitating thin die construction, flame hardening is recommended to prevent warp, save grinding to size. New design flame tip includes water jacket to permit careful control necessary to highly important quenching operation.

18-249. Flame-Hardening of Sprocket Teeth. Stephen Smith. *Machinery*, v. 51, Nov. '44, pp. 139-147.
Newly developed methods which will prove of great value in post-war applications.

18-250. Manufacture and Heat Treatment of Hairsprings. J. W. Whittaker. *Metal Treatment*, v. 11, Autumn '44, pp. 193-198.
Manufacture and heat treatment of fine instrument hairsprings.

18-251. Steel Treating. Fred P. Peters. *Scientific American*, v. 171, Dec. '44, pp. 253-254.
Wartime advances in the heat treatment of munition steel not only assure higher quality steel parts at lower cost for peacetime products, but will be responsible for widespread changes in the design and performance of lighter or more powerful engines and machines.

18-252. Practical Aspects of the Selection of Frequency and Time Cycles for the Processing of Metallic Parts by Induction Heating. H. B. Osborn, Jr. Electrochemical Society Preprint, 86-16, Oct. 16, '44, 1 p.
Proper frequency, time cycles, and inductor design, and their relationship to the shape and dimensions of the metal part being treated are extremely important.

(*Continued on page* 12)

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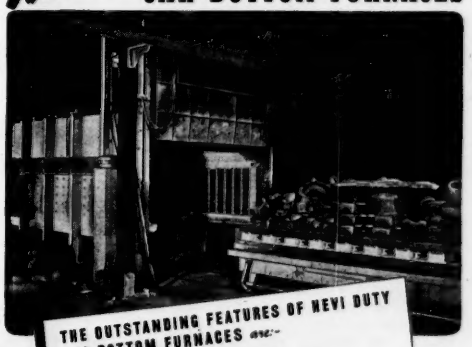

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Metal Literature Review

18. HEAT TREATMENT (*cont.*)

18-253. **Induction Heating and Its Application to Annealing and Melting.** J. W. Cable. Electrochemical Society Preprint, 86-18, Oct. 16, '44, 6 pp.
Annealing of steel cartridge cases; the localized annealing of large steel dies for stamping sheet metal; and the continuous heating of steel tubing.

18-254. **Case Hardening by Megacycle Induction Heating.** Vernon W. Sherman. Electrochemical Society Preprint, 86-22, Oct. 16, '44, 11 pp.
Radio frequency energy makes possible thin case hardening of finished ground metal parts without scaling or distortion. Megacycle induction heating reduces oxidation and scaling to negligible values even in ordinary atmosphere, and prevents alteration of the physical characteristics of the metal underlying the hardened case.

18-255. **Modification by Heat Treatment of Cast Structures and Properties.** H. T. Angus. *Foundry Trade Journal*, v. 74, Oct. 19, '44, pp. 131-135.
Castings can be heat treated to give reliable mechanical properties. 2 ref.

19. WORKING
Rolling, Drawing, Pressing, Forging

19-288. **The "Extrusion Effect" in Aluminum Alloys.** H. K. Hardy. *Metallurgia*, v. 30, Sept. '44, pp. 240-244.
Highest tensile values of certain aluminum alloys are obtained in the longitudinal direction of extruded material. 20 ref.

19-289. **Spar-Milling Operations in the Production of the Lancaster.** *Machinery* (London), v. 65, Sept. 28, '44, pp. 337-344.
Methods employed at a Vickers-Armstrong factory.

19-290. **Draw Presses Simplify Metal Working Jobs.** Merton J. Stevens. *American Machinist*, v. 88, Oct. 26, '44, pp. 119-120.
Method eliminates drop hammers for processing aluminum parts. Changeover effected savings in the costs of dies and set-ups.

19-291. **One-Shot Forging.** Arthur F. Macconochie. *Steel*, v. 115, Oct. 30, '44, pp. 74-77, 126.
Production of 155-millimeter shell produces thin-walled shapes with single stroke of press and provides solution of problems such as metal flow, stroke, punches and dies and lubrication.

19-292. **The Automatic Preset Screw-down.** R. E. Marrs. *Blast Furnace & Steel Plant*, v. 32, Oct. '44, pp. 1191-1197.
The fundamental idea; advantages of variable voltage amplidyne control incorporated; the Selsyn system; the electronic panel; the roll opening selector; the limit switch Selsyn unit; the pass transfer relay; the roll diameter selector; the mill Selsyn tachometer unit; the pass selector unit; the elementary diagram; what does the operator do?; typical operation.

19-293. **New Type of Cold Reducing Mill Placed in Operation.** *Blast Furnace & Steel Plant*, v. 32, Oct. '44, pp. 1220-1224.
Instead of the material passing through power driven rolls, the material is held in tension by a gripper and the rolls are moved by frictional contact between cam plates and the metal between the rolls approximating "turks head" rolling. The rolls are not driven by the direct application of power through spindles. Their motion and pressure are produced by the action of reciprocating cam plates.

19-294. **Flexural Strength in the Plastic Range of Rectangular Magnesium Extrusions.** F. A. Rappleyea and E. J. Eastman. *Journal of Aeronautical Sciences*, v. 11, Oct. '44, pp. 373-377.
Problem exists in the use of magnesium alloys in aircraft of determining the resisting moment in bending. Mathematical formula developed. 8 ref.

19-295. **Bending Preformed and Extruded Sheet-Metal Sections.** Thomas T. Tobin. *Machinery* (London), v. 65, Oct. 5, '44, pp. 365-371.
Use of wrap-forming and cam-type bending machines on aircraft structural members.

19-296. **Effects of Heating and Rolling on Blooms, Billets and Bars.** Robert Sergeson. *Iron & Steel Engineer*, v. 21, Oct. '44, pp. 35-41.
Discusses many of the factors which play an important part in the quality and structure of semi-finished steel.

19-297. **Effects of Heating and Rolling in the Strip Mill.** W. H. Richey. *Iron & Steel Engineer*, v. 21, Oct. '44, pp. 42-44.
With the many variables involved, strict control is essential to maintain high quality in flat-rolled products. Close cooperation is required between operating and metallurgical departments.

19-298. **The Mills.** Charles Moon. *Iron & Steel Engineer*, v. 21, Oct. '44, pp. 59-60.
Description of Great Lakes Steel Corp. mills.

19-299. **Roll Designing.** Thomas Smith. *Iron & Steel Engineer*, v. 21, Oct. '44, pp. 61-65.
Main steps to be taken.

19-300. **Forging Magnesium.** G. Ansel. *Light Metal Age*, v. 2, Oct. '44, pp. 14-17.
Properties, forging equipment, die design and actual forging practice.

19-301. **A Simple Hydro-Press Formability Test for Sheet Metal.** George C. Barber. *Automotive Industries*, v. 91, Oct. 15, '44, pp. 26-29, 86.
Information about the extent to which metal sheets may be bent, stretched or compressed under the rubber pad of the hydropress.

19-302. **Methods for Computing Springback When Bending Stainless Steel.** C. M. Brown, W. O. Binder and Russell Franks. *Metal Progress*, v. 46, Nov. '44, pp. 1077-1081-D.
Elastic theory of sheet metal bending and forming has been worked out by engineers in the aircraft industry, and tables, graphs and alignment charts for solving problems in die design for 18-8 and 17-7 steel sheet, both in annealed condition and cold rolled to various high yield strengths.
(*Continued on page* 14)

Employment Service Bureau

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated. Applicants for the positions listed below are required to observe the rules and regulations of the War Manpower Commission regarding a Statement of Availability, if employed in an essential activity.

POSITIONS OPEN

RESEARCH METALLURGIST: Graduate metallurgist for research in the field of welding metallurgy. Experience desirable; salary open. Battelle Memorial Institute. Send complete information to Edward V. O'Rourke, Personnel Advisor, 218 Lord Hall, Ohio State University, Columbus 10, Ohio.

SALES MANAGER: For well-established engineering organization devoted to design and construction of specialized industrial electric, gas and oil fired heat treating furnaces. Preferably experienced in directing and obtaining sales of specialized heat treating equipment or kindred lines. Location New England. Box 10-5.

METALLOGRAPHER: Experienced in preparing and determining metallographic specimens; experienced women may apply. NON-FERROUS METALLURGIST: For work on aluminum and magnesium. POWDER METALLURGIST. METALLURGICAL ENGINEER: For development work on steel forgings, tool steels. RESEARCH METALLURGIST: Work on special alloys to be used at elevated temperatures. Write Supervisor, Technical Department, 306 Fourth Ave., Pittsburgh, Pa. Westinghouse Electric & Mfg. Co.

METALLURGIST: $3,600; challenging opening. Research and development in brass including casting, rolling, annealing and surface finishing. Prefer young man with advanced metals education. Requires creative scientist eager to join nation-wide progressive firm. Associates posted on this ad. Submit credentials and photograph to box 12-5.

METALLURGISTS: $3,600. Excellent post-war connection with over 100 professional men. Prefer ferrous specialization machine tools. Our men acquainted with this ad. Send full application details and picture to box 12-10.

MARKET ANALYST: Midwest firm national scope. Attractive salary. Entails market studies and economic evaluation. Wrought copper-base alloys. Prefer college degree. Present employees know of this ad. Send qualifications and photo to box 12-15.

METALLURGIST: B.S. Degree; several years' tinplate experience. For container manufacturer in eastern Pennsylvania. Excellent opportunity. Give details, experience, personal data, etc. Box 12-130.

METALLURGICAL ENGINEER: Laboratory work in product and process development requiring college training in metallurgy or engineering. Involves research work in varied fields, principally ferrous. Of a long-term nature with salary commensurate with permanent peacetime products. Box 12-135.

WANTED: SALES ENGINEER

With executive ability; experienced in heat and corrosion alloy casting field. Permanent position with progressive company. Both inside and outside sales work. Excellent opportunity for capable man. Write details of age, training and experience.

Box 12-125

American Society for Metals

7301 Euclid Ave. Cleveland 3, Ohio

POSITIONS WANTED

METALLURGIST: B.S. in metallurgy, M.I.T., also graduate work. Four years' experience primarily in research and development, hardenability, properties and treatment of alloy steels; also inspection, testing and specification work; excellent metallographer. Can organize and design laboratory; has ability to change field of specialization. Desires position with post-war future in vicinity of Boston. Box 12-20.

METALLURGICAL ENGINEER: Six years' metallurgical experience in responsible positions. Set up laboratory and supervised extensive metal research and development for large organization. Experienced in physical metallurgy and fabrication of steel, aluminum, magnesium and stainless steels. Graduate of leading engineering school, E. Met. degree. Desires position as plant or research metallurgist. Box 12-25.

METALLURGICAL ENGINEER: Age 35. Experienced in supervision of metallurgical control laboratory, also technical control of heat treating and electroplating. Desires similar position with definite post-war prospects. Box 12-30.

METALLURGICAL ENGINEER: Age 38, B.S. and M.E. Eight years' experience in research and development of production and recovery processes; six years previously devoted to construction of power and refrigeration plants. Desires position of responsibility in small plant in southern states. Box 12-35.

PHYSICAL CHEMIST: X-ray and electron diffraction. Ph.D. equivalent, plus broad industrial experience in application of diffraction to metallurgy. Desires opportunity for research and development work. Available Dec. 15 on completion of current war research work. Box 12-40.

METALLURGIST-SUPERVISOR: 12 years' experience in non-ferrous mill products, cartridge case and hardware production; supervisory experience on sheet and strip production. Desires position in mill supervision, process metallurgy, or sales engineering. Location in Connecticut preferred. Box 12-45.

SALES MANAGER: Both alloy steel and non-ferrous experience. B.S. in mechanical engineering; age 30. Successful record in developing new markets for alloy metals among both consumer goods and capital goods industries in Ohio, West Virginia and Pennsylvania. Would like position with aggressive metal producer, fabricator, warehouse or manufacturer of metal working equipment. Box 12-50.

QUALITY SUPERVISOR: Age 50; wide experience in precision products. Desires position with firm that wants to build a better product at a reduced cost. Vicinity of Hartford, Conn. preferred. Box 12-60.

SALES AND PRODUCTION EXECUTIVE: Wide experience in alloy metals, development and sale of new products. Desires management position and preferably some financial interest in company allied with metal industry. Presently employed by large company; also owns and operates small company employing 30 people, which would consider merging with another organization. Mechanical engineering degree, age 31. Box 12-55.

CHEMIST-METALLURGIST: Now in charge of materials testing and development laboratory on major railroad, desires responsible position with a future, preferably in western or Pacific coast region. Broad experience with chemical, physical and optical test methods on wide variety of metals and non-metals. Supervision over heat treatment and welding; able to design, organize and supervise materials development laboratory. Age 47. Minimum salary $6,000. Box 12-65.

METALLURGIST: B.S. and M.S. in metallurgy; age 30. Wide experience in heat treating and general metallurgical work, including tool steels. Experienced in supervision of metallurgical control and research laboratory; also considerable work on permanent mold light castings. Desires responsible position with post-war future; location immaterial. Box 12-70.

METALLURGICAL-CHEMICAL ENGINEER: B.S. and M.S. and one semester short of a Ph.D., age 38, married. Fifteen years' experience in spring and small stamping manufacture, covering material control, heat treat control, research and development work, new designs. Good personality and experience with customer contact work. Minimum salary $10,000. Box 12-75.

METALLURGIST: Three years' college, four years' mill and forge shop experience. At present assistant chief metallurgist, large forge shop. Contact position in western area preferred. Sinus condition forces change in climate. Army discharge. Box 12-80.

HEAT TREAT FOREMAN: 11 years' experience on machine and aircraft engine parts; also all types of tool steels. At present has charge of heat treat, heat treat inspection, straightening and sand and gait blasting and tool stores. Box 12-85.

MATERIALS ENGINEER: 14 years' experience in testing non-ferrous alloys in creep, fatigue, fracture and metallography. Research done in large midwestern university and sponsored by utilities. M.S. degree, age 37. Desires position in industry; location immaterial. Box 12-90.

METALLURGIST: 15 years' experience with ferrous metallography, heat treating, physical metallurgy, X-ray diffraction, and radiography. Desires responsible supervisory position with progressive company. Box 12-95.

METALLURGIST: Six years' diversified research experience in steel, non-ferrous metals and welding. Capable of directing own efforts and those of others. Desires permanent connection in development or research with progressive company. Chicago area preferred. Box 12-100.

METALLURGIST-CHEMIST: M.S. Met. Eng., B.S. Chem. Eng. Nine years' experience in steel manufacture, heat treat, and as director of chemical and metallurgical laboratories; some experience in electroplating, forging and foundry work in both aluminum and gray iron. Supervisory position for past five years. Family man, age 35. Midwest. Minimum salary $8,000. Box 12-105.

ENGINEERING SALES REPRESENTATIVE: Established, Pittsburgh office. Interested in additional account for sale of equipment or material to steel, glass and oil industries. Exclusive territory, straight commission basis only. Box 12-110.

CHEMICAL-METALLURGICAL ENGINEER: B.S. in Chem. Eng. with major in metallurgy; age 25, draft deferred. 2½ years' diversified experience in ferrous and non-ferrous metals and alloys. Desires sales engineering position with post-war future in small, aggressive company. Location east or midwest. Box 12-115.

METALLURGIST-ENGINEER: B.S. degree, age 27; 6 years' experience in non-ferrous working and cold finishing industries including foundry, mill, development, supervision and administration. Desires permanent position with post-war future in metal industry. Box 12-120.

PHYSICAL METALLURGIST-CHEMIST: Heat treating methods, control heat treating department, plain and alloy steels; magnaflux; direction of metallurgical, metallographic and chemical laboratory; some experience in brass and zinc coated wire; dies, precision centrifugal steel casting; austempering. Reads several continental languages. Executive ability; above draft age. Box 9-55.

METALLURGIST: Seven years' experience tool, stainless and alloy steel manufacturing and heat treating; 9 years drop forge, heat treat development and cold heading; 2½ years trouble shooting, heat treat difficulties, spot welding, and brazing as manufacturing engineer. Not employed to fullest extent of ability. Desires position as material and process engineer, development and heat treating. Box 12-140.

METALLURGIST: Age 28, married, graduate in chemical engineering and metallurgy. Five years' experience in steel manufacture and three years as chief metallurgist in parts manufacture. Will also consider position as contact representative or sales and service engineer in steel or steel parts manufacture and associated fields. Midwest preferred but free to move. Box 12-145.

GRADUATE METALLURGICAL ENGINEER: Age 35, married. Eleven years' experience in all phases of fabrication and heat treatment of ferrous metals, particularly alloy steels. Production control, development work and customer contact experience. Desires responsible, permanent position. Salary $7,000 minimum. Location immaterial. Box 12-150.

METALLURGIST: B.S. and M.S. degrees and 15 years' diversified experience, including iron foundry and open-hearth steel practice; research and development; heat treatment of carbon. alloy and tool steels; supervision of control laboratory investigating and diagnosing service failures. Desires responsible position in metallurgical laboratory or heat treating department. Salary open. Box 12-155.

FOR SALE: 750,000 new steel pins; 7¾ in. long, pointed on one end with loop 1½ in. inside diameter on other end; $\frac{7}{32}$ in. thick; galvanized. D. L. Lukens, 109 North St., Harrisburg, Pa.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Jan. 15		E. E. Thum	Metals in Armor and Armament (With Some Thoughts on Influence of Air Power on Future History)
Birmingham Dist.	Jan. 16		H. Forman	Metal Plating Problems
Boston	Jan. 5	Hotel Sheraton	M. Gensamer	Behavior of Metals Under Plastic Deformation (Sauveur Night)
British Columbia	Jan. 15	Brock Memorial Bldg., U. B. C.	Harold Babcock	Electric Salt Baths in Modern Heat Treating
Buffalo	Jan. 11	Hotel Statler	L. N. Nelson	Manufacture of Electric and Open-Hearth Steels
Calumet	Jan. 9	Phil Smidt's, Hammond, Ind.	A. E. Murton	Manufacture and Application of Rolls
Canton-Mass.	Jan. 18	Elks Club	B. F. Shepherd	Martempering
Chicago	Jan. 11	Chicago Bar Association	Kent R. Van Horn	National President's Night
Cincinnati	Jan. 11	Cincinnati Milling Machine Co.		Joint Meeting with American Welding Society
Cleveland	Jan. 8	Cleveland Club	Morris Cohen	Metallography of High Speed Steel
Columbus	Jan. 9	Fort Hayes Hotel	F. F. Tatnall	Strain Gages
Dayton	Jan. 10	Engineers Club	Roland Koehring	Powder Metallurgy
Detroit	Jan. 8	Rackham Bldg.	Wm. M. Phillips	Use of Plastics on Automobiles, Past and Future.
Ft. Wayne	Jan. 23	Chamber of Commerce	Kent R. Van Horn	Applications of the Aluminum Casting and Wrought Alloys
Georgia	Jan. 8	Duchess Coffee Shop		Plastics
Hartford	Jan. 9	Hartford Electric Light Co.	A. H. d'Arcambal, Technical Chairman	"Information Please" Meeting
Indianapolis	Jan. 15	Y. W. C. A.	E. G. Mahin	Training for Careers in Metallurgical Fields
Louisville	Jan. 16	Ky. Hotel	L. W. Davis	Aluminum Alloy Forging Materials and Design
Mahoning Valley	Jan. 9	Dinner Bell	J. C. Siegel	Steel Pipe Drills Oil Wells
Manitoba	Jan. 11	Marlborough Hotel, Winnipeg		Ladies' Night
Milwaukee	Jan. 9	Milwaukee Athletic Club	Kent R. Van Horn	Metallurgy of the Aluminum Alloys
Montreal	Jan. 8	Queen's Hotel	Merle B. Halfpenny	Practical Forging of Steel
Muncie	Jan. 10	Anderson Y. M. C. A.	A. L. Feild	Stainless Steels
New Haven	Jan. 18	Hotel Barnum, Bridgeport, Conn.	F. G. Tatnall	Strain Gages and Their Application
New Jersey	Jan. 15	Essex House, Newark	G. B. Duff, F. T. Chestnut, and W. M. Gager	Modern Heat Treating Methods
New York	Jan. 8	2 Park Ave., 26th Floor	Norman L. Mochel	Shall It Be Cast? Forged? or Welded?
North Texas	Jan. 24	Meadowbrook Country Club, Ft. Worth	K. P. Campbell	Steels Made in Texas
North West	Jan. 8	University of Minnesota	Kent R. Van Horn	Radiography of Metals
Notre Dame	Jan. 10	Engineering Auditorium, University of Notre Dame	Kent R. Van Horn	Metallurgy of the Aluminum Alloys
Ontario	Jan. 5	Royal York Hotel, Toronto	R. B. Seger	Practical Heat Treatment of Steel
Oregon	Jan. 12		Harold Babcock	Isothermal Heat Treating
Philadelphia	Jan. 26	Engineers Club	Marcus A. Grossman	Hardenability of Steel: Interpretation and Applications
Pittsburgh	Jan 11	Roosevelt Hotel	E. C. Wright, Gordon M. Yocum, and J. D. Armour	The Future of the Bessemer Process
Puget Sound	Jan. 17	Washington Athletic Club	Harold J. Babcock	Electric Salt Baths in Modern Heat Treating
Rhode Island	Jan. 3			January Thaw Party
Rocky Mountain	Chapter			
Pueblo Group	Jan. 18	Vail Hotel	Walter Mathesius	The Geneva Steel Plant
Denver Group	Jan. 19	Oxford Hotel	Walter Mathesius	The Geneva Steel Plant
Rochester	Jan. 3	Lower Strong Auditorium, University of Rochester	E. S. Davenport	Isothermal Transformation of Steel
Rockford	Jan. 17	Faust Hotel	Paul C. Tietz	Plastics
Saginaw Valley	Jan. 16	General Motors Institute, Flint, Mich.	J. Manuele	Statistical Methods of Quality Control
Syracuse	Jan. 2		E. S. Davenport	Isothermal Transformation
Texas	Jan. 23	Texas State Hotel	Blaine B. Wescott	Fatigue and Corrosion Fatigue of Steels
Toledo Group	Jan. 24	Toledo Yacht Club	O. J. Horger	Fatigue Analysis and Photo-Elastic Studies
Tri-City	Jan. 9	Hotel Ft. Armstrong, Rock Island, Ill.	Al Demmler	Inherent Characteristics of Steels and Irons
Warren	Jan. 11	IOOF Hall	R. W. Thompson	New Developments in Ferrous and Non-Ferrous Forging Practice
Washington	Jan. 8	Dodge Hotel		Movie Night
West Michigan	Jan. 15	Rowe Hotel, Grand Rapids, Mich.	J. P. Gill	Tool Steel
Worcester	Jan. 10	Hotel Sheraton	J. A. Comstock	Production Heating Problems Encountered on Small Parts
York	Jan. 10		W. F. Hanson	High Strength Irons or Alloys in Cast Iron

Personnel Problems Raised by War

(*Continued from page* 1)

period there will be a problem for some years in integrating the technical veterans into our industries and our educational systems. H. Wysor of the Bethlehem Steel Co. also took part in this discussion.

B. D. Saklatwalla of New York Killed in Plane Crash Nov. 4

Beram D. Saklatwalla, 63, partner in the Alloys Development Co., New York, and formerly vice-president and research director of Vanadium Corp. of America, was one of 24 persons killed Nov. 4 in a plane crash near Hanford, Calif. A consultant in chemical and metallurgical fields, Dr. Saklatwalla was the author of many technical papers and held more than 130 United States and foreign patents. He was a fellow of the American Association for the Advancement of Science and holder of the 1924 Grasselli Medal of the Society of Chemical Industry. In 1906 he was awarded the Carnegie Gold Medal for metallurgical research.

Born in Bombay, India, Dr. Saklatwalla graduated from St. Francis College, Bombay, and continued his technical education at the Royal Polytechnic Institute in Charlottenburg, the Mining Academy and the University of Berlin. He came to the United States in 1909 and joined Vanadium Corp. of America, New York, pioneering in devising smelting processes and in finding applications for vanadium in steel metallurgy. He resigned in 1935 to organize the Alloys Development Co.

He was a member of the American Society for Metals, American Institute of Chemical Engineers, American Chemical Society, Electrochemical Society, British Institute of Metals, and many others.

John J. Larkin

Larkin Packer Co., Inc., St. Louis, Mo., has announced with deep sorrow the death of John J. Larkin, president and founder of the company, on Oct. 23.

CALENDAR OF OTHER MEETINGS

Jan. 8-12—Society of Automotive Engineers. 1945 War Engineering Annual Meeting, Book-Cadillac Hotel, Detroit. (John A. C. Warner, Secretary, 29 West 39th St., New York.)

Jan. 10-11—Institute of Scrap Iron and Steel, Inc. Annual Meeting, Cincinnati, Ohio. (E. C. Barringer, President and Executive Secretary, 1120 Connecticut Ave., N.W., Washington 6, D. C.)

Jan. 22—American Society for Testing Materials, Philadelphia District. Symposium on Magnetic Particle Testing, Hotel Benjamin Franklin, Philadelphia. (Robert J. Painter, Assistant to the Secretary, 260 South Broad St., Philadelphia 2, Pa.)

Effect of Four Methods of Steel Plant Control Described

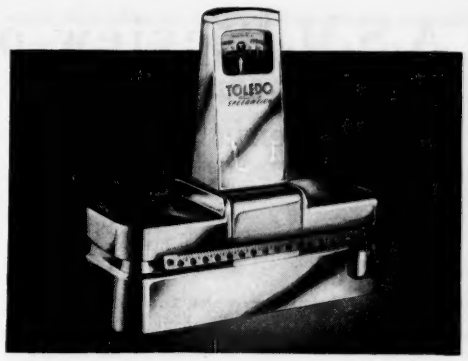
(*Continued from page* 1)

Then followed a presentation of some of the steel maker's problems during the past three years. One of these was the difficulty in obtaining sufficient amounts of lump ore for the expanded steel tonnage and the increased amount of hot metal for steel making. This problem was solved by determining the practical limits in the use of soft lake ores, utilizing these ores up to these limits, and in producing nodules in cement kilns.

Another problem was adequate aluminum supplies; the steel industry has overcome this shortage through the substitution of a number of deoxidizers which resulted in a 25 to 30% reduction in the aluminum requirements of the industry.

Finally, in solving the alloy shortage, two factors were a substitution of low content for high content alloy steels and a greatly increased recovery of alloys from scrap. This latter increase in recovery of alloys was the equivalent of about 20% of the total supply of virgin alloys for steel making.

The coffee speaker was Dr. Pun Kien Koh, a graduate in metallurgy of M.I.T., who early this year returned from five years as metallurgist of Central Electric Manufacturing Works in Kunming, China, to engage in a metallurgical research project at M.I.T. Dr. Koh was adept in presenting his technical data.



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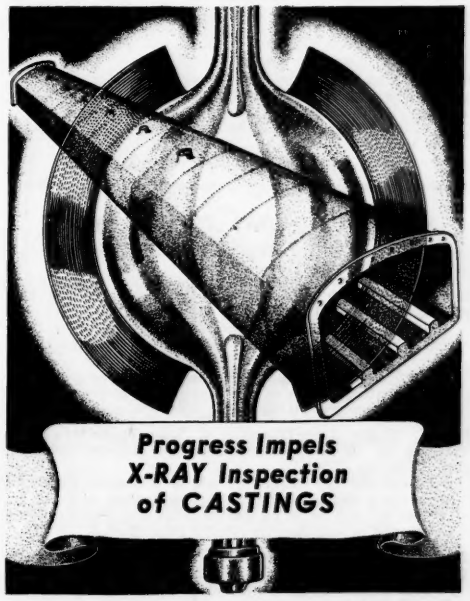

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A.S.M. Review of Current Metal Literature — *Continued*

19. WORKING (*cont.*)

19-303. The design for Production of Sheet Metal Aircraft Parts. Frank M. Mallett. *SAE Journal*, v. 52, Nov. '44, pp. 526-533.
Determining of working limits of elongation and compression in different types of sheet metal forming, and the application of these limits to the design for formability. 16 ref.

19-304. An Appraisal of Precision Thread Rolling Practice. Frank J. Oliver. *Iron Age*, v. 154, Nov. 9, '44, pp. 69-74.
Die design factors and performance characteristics of the several grades of tool steel employed for flat dies compared.

19-305. The Use of Rubber in Conjunction with Press Tools. *Machinery*, v. 51, Nov. '44, pp. 161-165.
Effective and economical methods of producing a wide range of sheet-metal parts.

19-306. Hard-Faced Punches and Dies Used to Blank Tungsten Sheet. Howard W. Philip. *American Machinist*, v. 88, Nov. 9, '44, pp. 105-106.
Tools hardened with Tantung 53 satisfactory for meeting high temperatures necessary for the blanking operations on tungsten.

19-307. Designing Tools for Forging. George Espey and Pat Culhane. *Steel*, v. 115, Nov. 13, '44, pp. 108-111, 148, 151-152, 154, 156, 158, 160, 162, 164, 166, 168.
Principles behind correct tool design as applied to pierce-bottom-and-draw and other methods of forging shell. 16 ref.

19-308. The Ford "Greenhouse Job" Requires Many Unique Press Operations. P. D. Aird. *Modern Industrial Press*, v. 6, Nov. '44, pp. 15-18.
The press-work operation which transforms a shimmering sheet of aluminum into the framework of the pilot's enclosure in one of the Army's heaviest bombers. Difficult structural angles, deep channeled draws, close manufacturing tolerances, a complicated preforming operation and a series of trim and piercing operations.

19-309. The Drop-Hammer at Douglas. E. E. Hanson. *Modern Industrial Press*, v. 6, Nov. '44, pp. 22, 24.
Drop-hammer is a cold process in aircraft. Production drop-hammer work starts with the dies and continues in all stages between and up to the final inspection before fabrication.

19-310. Designing of "Trouble-Free" Dies, XXXII. C. W. Hinman. *Modern Industrial Press*, v. 6, Nov. '44, p. 26.
"Blank thickness separator" is a simple but highly efficient device for producing certain types of drawn shells.

19-311. Contour Forming with Linkage Action Stretch Dies. Roy W. Osborn. *Modern Industrial Press*, v. 6, Nov. '44, pp. 31-32.
Forming of deeply contoured sections with "toggle" acting dies.

19-312. Methodical Die Planning for Maximum Production at Lockheed Aircraft Corporation. Jack L. McGraw and W. Glenn Swartz. *Modern Industrial Press*, v. 6, Nov. '44, pp. 34, 36, 38.
The clamp; finish form clamp die; operation; the socket; second operation socket die (reverse draw); third operation form die (reduction draw).

19-313. Low Priced Blank and Pierce Dies, I. James Walker. *Modern Industrial Press*, v. 6, Nov. '44, pp. 40, 42.
The discovery of many new methods.

19-314. Stretch-Forming Extruded Shapes. B. K. B. *Machinery* (London), v. 65, Oct. 19, '44, pp. 429-435.
Producing uniform and irregular curves in rolled or extruded shapes of aluminum alloy by bending the material over a form of the required shape and elongating the material until it is stressed to a point somewhere between the yield point and the ultimate strength.

19-315. Pneumatic Accumulator Aids Forging of Shells. C. H. Vivian. *Industrial Gas*, v. 23, Nov. '44, pp. 12-14, 29-30.
Forging projectiles for 75-mm. and 105-mm. shells from steel blanks and machining them.

19-316. Zinc-base Alloy Dies Prove Economical for Producing Short Runs of Stampings. *Steel*, v. 115, Nov. 20, '44, pp. 114, 158, 160.
Outlines the use of Kirksite for flexible sheet metal dies and tools.

20. MACHINING AND MACHINE TOOLS

20-414. Punch & Form Shaping Machine. *Engineering*, v. 158, Sept. 29, '44, p. 246.
Designed primarily for the shaping of punches, particularly those of irregular contour in cross-section, an operation it accomplishes by employing an ordinary cutting tool which makes a reciprocating stroke over the operative length of the punch and finishes with a radial movement at the end of the stroke.

20-415. Taper Line-Reaming of Ship Propeller-Shaft Flanges. G. D. Bowman. *Machinery* (London), v. 65, Oct. 5, '44, pp. 373-374.
Equipment for doing this job in minimum time and with the holes reamed within a tolerance of 0.001 in. or less to receive fitted flange bolts has recently been developed at the Joshua Hendy Iron Works.

20-416. Thread Recesses. D. G. Haddock. *Machinery* (London), v. 65, Oct. 5, '44, pp. 375-376.
Determination of the most suitable width for the thread recess.

20-417. Keighley Internal-grinding Machine Attachments. *Machinery* (London), v. 65, Oct. 5, '44, pp. 385-386.
Machine equipped with an auxiliary facing and cylindrical grinding head, sliding-jaw collet chuck, chuck-operating mechanism and a rotary diamond dresser.

20-418. Punches and Dies. *Automobile Engineer*, v. 34, Oct. '44, pp. 417-419.
Some English machines developed for sawing, filing and shaping.

20-419. "Borlocator" Jigs and Fixtures. *Tool & Die Journal*, v. 10, Oct. '44, pp. 132-133.
A method whereby an infinite variety of production and/or inspection jigs and fixtures can be readily and accurately assembled.

20-420. Refrigeration of Coolants for Machine Tools. B. S. Williams. *Heating & Ventilating*, v. 41, Oct. '44, pp. 63-66.
High cutting speeds may cause a welding action between the chip and the tool, and a softening of the tool edge. This results in a poor finish, excessive tool wearing, and loss of production. To reduce these high temperatures, refrigeration of the coolant or cutting oil has been successfully employed.

20-421. Plastic Masters Assure Accurate Checking of Assembly Jigs. Rupert Le Grand. *American Machinist*, v. 88, Oct. 26, '44, pp. 91-94.
Cast-plastic replicas of lofted aircraft sub-assemblies need not be stored under controlled temperature and humidity conditions in order to be certain that they retain dimensional stability.

20-422. Fixture Spaces Keyways Accurately. Carl G. Preis. *American Machinist*, v. 88, Oct. 26, '44, p. 95.
Device for milling keyways on torpedo propeller shafts to close tolerances, 90° apart.

20-423. Thread Errors Can Be Overcome Through Slight Cutter Design Changes. Roger W. Bolz. *American Machinist*, v. 88, Oct. 26, '44, pp. 98-100.
Undercutting by a thread mill can be prevented by correcting the tooth form in accordance with calculations to learn the amounts and position of error.

20-424. Diamond Tools Easily Fabricated for Any Shop Need. E. J. Summerill. *American Machinist*, v. 88, Oct. 26, '44, p. 101.
Diamonds used for dressing or truing grinding wheels usually are mounted in their natural form, but can be sharpened to a point or chisel edge depending upon the type of duty required.

20-425. Fly Cutters Used to Form-Mill Contours on Compressor Rotors. Milton Hoeppner. *American Machinist*, v. 88, Oct. 26, '44, pp. 102-104.
Special cutters which replace the usual form-milling tools are made by inserting steel bits in the cutter body, which is made integral with its arbor.

20-426. Practical Ideas. *American Machinist*, v. 88, Oct. 26, '44, pp. 105-110.
Grinder which sharpens all reamers uniformly to standard taper. Broken shafts repaired by butt welding. Hold-down plate for drilling bundles of aluminum blanks. Tailstock prevents chatter of boring bars. Lathe toolholder with a wide range of uses. Cutter grinder with indexing plate used for tool grinding. Device for drilling at 90° to contoured surfaces. Radial drill jig locking devices. Turning small slender parts on a lathe. Bandsaw trim guide eliminates scribing from templets.

20-427. Pneumatic Clamps Simplify Tooling. C. H. Bodner. *American Machinist*, v. 88, Oct. 26, '44, pp. 111-118.
Make full use of pneumatic clamping by stocking standard air vises and cylinders, and adapting them to machining set-ups.

20-428. Cemented-Carbide Cutting Tools. *Machinery* (London), v. 65, Oct. 12, '44, pp. 393-400.
Special reference to applications and tests of tools with negative rake.

20-429. Diamond Powder and Its Applications. *Machinery* (London), v. 65, Oct. 12, '44, pp. 403-405.
Production methods; diamond dies and diamond-tipped tools; operation on jewel bearings, quartz, knife edges and crystal optical glass working; sintered carbide tools and dies.

20-430. Jig for Boring Thin Steel Rings. A. L. Sims. *Machinery* (London), v. 65, Oct. 12, '44, pp. 406-407.
The gripping and releasing of the ring to be machined is obtained from the up-and-down movement of the drilling-machine spindle.

20-431. Hyperbolic Boring of Holes. *Machinery* (London), v. 65, Oct. 12, '44, pp. 408-409.
Prevents edge pressure in bearings being caused by the elastic deflection of shafts.

20-432. Simplifying Cowl Fabrication. *Machine Tool Blue Book*, v. 40, Nov. '44, pp. 165-166, 168, 170, 172, 174, 176.
Eliminating eight parts that previously had to be assembled by spot welding and riveting methods into one piece of cowling, has effected a saving of 112 man-hours per airplane.

20-433. An Investigation of Radial Rake Angles in Face Milling. J. B. Armitage and A. O. Schmidt. American Society of Mechanical Engineers *Transactions*, v. 66, Nov. '44, pp. 633-643.
The effect of negative and positive radial rake angles in milling cutters upon the power required for the cutting action, the tool life of the cutter, the surface finish, and temperature of the workpiece. 9 ref.

20-434. Hollow Mills Used in Machining Die Cast Cylindrical Plugs. *Die Castings*, v. 2, Nov. '44, pp. 62-64.
Combination box tool and hollow milling head for finishing the outside diameters of die cast plugs for cylinder locks. Details of the cutting bits and guide bits.

20-435. Machining — Usual and Unusual — That Makes Die Castings Practicable. *Die Casting*, v. 2, Nov. '44, pp. 73-74, 77-79.
Precision machining of small motor parts involves careful tooling and fixture set-ups to prevent distortion of thin-wall sections. Describes several high speed machining operations developed for die cast parts.

20-436. Recent Progress in High Speed Tapping, II. C. W. Hinman. *Modern Machine Shop*, v. 17, Nov. '44, pp. 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160.
Ideal set-up for precision tapping. Considerations in the design of tapping fixtures. Tapping suggestions.

20-437. Tooling Revisions. G. Eldridge Stedman. *Steel*, v. 115, Nov. 6, '44, pp. 110-113, 142.
Reduce machining time about two-thirds, help cut man-hours for production of B-25 Mitchell bombers from 16,000 to only 6000. Costs likewise greatly reduced by flywheel type coarse-tooth milling cutters and efficient fixtures.

20-438. The Behavior and Control of Wet Wire Drawing Lubricants for Copper. Robert C. Williams. *Wire & Wire Products*, v. 19, Nov. '44, pp. 771-772, 805.
Variables in the use of lubricants; water as a variable; control and influence of pH; mechanical design effects; laboratory control.

20-439. Effect of Coolant Fluid Temperatures on Cutting Tool Efficiency. *American Machinist*, v. 88, Nov. 9, '44, pp. 96-99.
Cutting fluid evaluation tests established various temperature values for the highest cutting speeds and longest tool life.

20-440. Dowel-Pin Holes Precision Bored. Milton Hoeppner. *American Machinist*, v. 88, Nov. 9, '44, pp. 100-101.
Boring of dowel-pin holes to insure accurate assembly.

20-441. High Speeds and Few Teeth Add to Cutter Life and Accuracy. Roger W. Bolz. *American Machinist*, v. 88, Nov. 9, '44, pp. 102-104.
Cutters should be designed so number of teeth permit maximum feed. Abrasive action and heat will be reduced and add to service life of thread mills.

20-442. Practical Ideas. *American Machinist*, v. 88, Nov. 9, '44, pp. 107-112.
Two grinding operations combined. Bakelite mold that eliminates flash. Production tripled by revision of a milling process. Special guard removes hazards in grinding carbide-tipped tools. Novel milling cutter for finishing hard, dirty castings. Adjustable drill jig locates centers on metal strips. Friction block prevents scarring of work by shaper tools. Improvised boring tool for removing broken drill points. A duplex form block.

20-443. Collet Chucks of Special Design. Donald A. Baker. *Machinery*, v. 51, Nov. '44, pp. 166-168.
Design details.

20-444. An Appraisal of Precision Thread Rolling Practice. Frank J. Oliver. *Iron Age*, v. 154, Nov. 2, '44, pp. 48-55, 132, 134.
Factors bearing on the problem of rolling thread in high strength alloy steel with hardnesses ranging up to Rockwell C-36 and with tolerances corresponding to Class 3 and 4 fits. General principles are discussed and the characteristics of both straight and cylindrical die machines described.

20-445. Grinding Compound Angles on Forming Tools. Charles L. Hall. *Tool Engineer*, v. 14, Nov. '44, pp. 67-69.
Easy to use formulas developed from long toolroom experience, save hours of cut-and-try, and assure holding cutting angles through continued regrinding. They can be applied to determine unknowns wherever similar compound angles may occur.

20-446. Special Cutting Head Speeds Boring Mill Output. Carl Eberhardt. *Tool Engineer*, v. 14, Nov. '44, pp. 70-72.
Tooling flexibility accounts for speed and economy in the growing number of short run orders. How it is done.

20-447. Tooling Dock Aids Jig Boring. Thomas A. Dickinson. *Tool Engineer*, v. 14, Nov. '44, pp. 88-91.
Designed for the aircraft industry, the master tooling dock is useful in the automotive field, or wherever economical production depends upon the development of precise and coordinate tools and gages. Addition of accessories for precision boring adds to its practical possibilities.

20-448. The Selection and Use of Cutting Fluids. H. W. Fowler. *Steel*, v. 115, Nov. 13, '44, pp. 122, 125-126.
Detailed consideration of origin and development of cutting fluids provides ready index for improved production procedures. Tables of machinability simplify selection of correct fluid type for any job.

20-449. An Appraisal of Precision Thread Rolling Practice. Frank J. Oliver. *Iron Age*, v. 154, Nov. 16, '44, pp. 64-69.
Methods of obtaining rigid control of blank diameter are discussed and typical thread failures are analyzed. Cooling and filtration of lubricants adds to die life.

20-450. Negative Rake Milling. *Metal Treatment*, v. 11, Autumn '44, pp. 189-192.
High speed milling with cemented carbide tipped negative rake cutters. Principles briefly explained.

20-451. Coordinate Layout Calculations for Jig Borer Work. Stephen E. Woodbury. *Iron Age*, v. 154, Nov. 23, '44, pp. 60-62.
Methods and formulas for calculating with comparable accuracy the dimensions needed for the drawing. Examples for holes arranged in a triangle and in a circle, taking the difficult case involving a prime number of holes. Several checks are given.

21. CLEANING AND FINISHING

21-144. Plastic Coatings for Metals. Charles Delmar Townsend. *Iron Age*, v. 154, Nov. 2, '44, pp. 56-57.
Use of synthetic coatings for newly developed plastic materials will improve the surface of the metal considerably, will cut finishing costs, and will increase the salability and market value of the product.

21-145. Measuring and Designating Surface Finish. James A. Broadston. *Iron Age*, v. 154, Nov. 2, '44, pp. 58-62.
Methods of comparing surface finishes, including a description of a new low cost comparison roughness gage made of plastic, which promotes surface quality control not only in the plant machine shop but also among parts suppliers scattered over wide areas.

21-146. Polishing and Buffing Die Castings. L. Ralph Eastman. *Die Casting*, v. 2, Nov. '44, pp. 67-68.
Plant layout; selection of type of buff and wheel speed.

21-147. Surface Finish—Key to Bearing Life. E. L. Hemingway. *Machine Design*, v. 16, Nov. '44, pp. 123-128.
Cross-direction, closely spaced, fine scratches increase load capacity. Welds formed on such surfaces should be restricted in size, and should immediately be detached just like chips in an intermittent cut on an engine lathe. It has been determined that such surfaces form a glaze more rapidly than others of the same scratch depth.

(*Continued on page* 16)

Wartime Developments Presage Changes in Peacetime Metallurgy

Reported by Joseph Mazia
Metallurgist, Frankford Arsenal

"They shall beat their swords into plowshares and spears into pruning hooks" was the keynote of the inspired technical address given by Norman L. Mochel, manager, metallurgical engineering, Westinghouse Electric & Mfg. Co., before an early meeting of the Philadelphia Chapter at Temple University. Sparing no tender sensibilities and pulling no punches, Mochel told about the weeds as well as the beautiful flowers in the wartime metallurgical garden.

Development of gas turbines made a fascinating story, involving a delicate balance of engineering choice of materials depending on temperatures, duration of use, working stress and allowable deformation. In the postwar period greater development of heat resisting materials is anticipated and will permit longer life of gas turbines.

Other major fields in which wartime development has been phenomenal and which point to changes in peacetime metallurgy include arc welding of fabricated structures, NE steels, greater use of hardenability and hardenability bands, new tool steels, sintered carbides and molded tool materials, tin conservation measures, increase in light alloy fabrication facilities, advances in testing methods, steel castings, furnaces and heat treating methods. Great changes in the quality of postwar structures should result from control by million-volt X-ray, magnetic particle testing, and radiography with radium.

Mochel pointed to thermal cracks in forgings and troubles with steel castings as the major weeds in the garden of wartime metallurgy. These weeds, he stressed, must be pulled in the postwar period.

The dinner speakers were W. E. Gladfelter and Floyd T. Tyson of Temple University, who pointed out the important role which colleges play in technical education for war and peace. The Philadelphia Chapter was congratulated by Charles E. Metzger, director of the Extramural Division of Temple University, for an important job well done in sponsoring metallurgy training at Temple University.

Contest! Win a Prize!

Any A.S.M. member who can name the prominent Chicago furnace manufacturer shown in the minstrel group below will be rewarded with a fur-lined super-cyclone. Send in your entry. No box-tops or wrappers required.

Tee-Bend Test for Weldability Explained by Leon C. Bibber

Reported by Lawrence Jacobsmeyer
General Manager, Salkover Metal Processing Co.

At the Nov. 9th meeting of the Chicago Chapter the technical chairman, T. B. Jefferson, editor of *Welding Engineer,* introduced the speaker, Leon C. Bibber, welding engineer of the Carnegie-Illinois Steel Corp.

The speaker's subject was entitled "The Tee-Bend Energy Test for the Determination of the Weldability of Steels." According to Mr. Bibber, the word "weldability" is being used until such time as a committee, already appointed, defines what is meant by this term.

He has found the Tee-bend test very helpful in evaluating the response of a given steel to a standardized welding operation. A 12 by 4-in. Tee is made by joining a 4 by 6-in. leg to a 6 by 12-in. top, and running fillet welds along each side of the leg. The Tee is then sawed into 1¼-in. lengths and tested in bending, with leg down, in a standard jig, noting the load and angle of deflection at first failure. The result of this rather simple and fast test gives energy absorption to fracture in inch-pounds, and can be compared to a standard mild steel.

Mr. Bibber showed a very attentive audience a number of curves and tables on the effect of the heat treatment on numerous steels of a wide range of chemical composition.

Bates Transforms Alarm to Relief

Reported by C. T. Greenidge
Battelle Memorial Institute

A spellbound Columbus audience heard A. Allan Bates of Westinghouse Electric & Mfg. Co. discuss "Plastics and Metals" before the chapter meeting on Oct. 24. Anxious metallurgists sat on the edges of their chairs as Dr. Bates described plastic pipe and fittings, plastic gears, forming sheet plastics, corrosion resistant plastics, and plastics with mechanical properties alarmingly similar to those of metals. Verily, plastics have invaded the sacred province of metals.

Just as the metallurgists were ready to toss in the sponge for old man metal, Dr. Bates showed that metals did have a few properties not common to plastics; furthermore, that the use of plastic materials would undoubtedly increase the demand for metals. Ah! What a relief to the metallurgists!

Importance of Stress Analysis In Operating Parts Shown

Reported by E. V. Ivanso
Steel Sales Corp.

Since compromises must be resorted to in the design of structural parts, Charles Lipson of the Chrysler Corp. in his talk entitled "Structural Considerations in the Development of Automobile and Aircraft Parts" before the Detroit Chapter meeting on Nov. 13 proceded to outline the role of the stress engineer in striving toward the ideal condition of minimum cost and weight with maximum performance.

In attacking a particular problem the stress engineer determines the operating conditions and then duplicates them as nearly as possible in the laboratory. Resultant stress measurements are made by photoelasticity, stresscoat, extensometers or strain gages. Then, with proper consideration of the physical properties of the materials, suitable specimens are given laboratory tests in fatigue, impact, and so on, to confirm the stress calculations and design data. Finally, preliminary models of the actual parts are given dynamometer tests, and finally road tests for further confirmation. (Typical problems were outlined, as were considerations of notch sensitivity in different materials and under varying conditions.)

In the above procedure, the externally imposed stresses under the given service conditions are not the only ones, since the residual or internal stresses also play a large part in ultimate performance. Their extent and importance depend upon the fabrication method, heat treatment and type of material. Suitable means for determining the extent and distribution of internal stresses were described, and methods for mitigating their influence, as by shot-peening, nitriding and by other surface treatments, were touched upon.

As the demand for greater performance at lower cost continues, we must continually increase our attention to such structural considerations in the design of all stressed parts.

Moisture Necessary in Furnace Atmospheres, Sam Tour Points Out

Reported by G. S. Shoop
Inspection Engineer, Tennessee Coal, Iron and Railroad Co.

Discussing "Heat Treatment of Steel in Controlled Atmospheres" at the Oct. 24th meeting of the Birmingham District Chapter, Sam Tour, president, Sam Tour & Co., Inc., and consulting engineer, C. I. Hayes, Inc., stressed the importance of the presence of moisture in the furnace atmosphere. It acts as a catalyst for the fuel-air reaction; that is, it speeds up the reactions but does not change the ratios. As combustion with most fuels produces water in the furnace, the lecturer considered attempts to dehydrate the air and gas before combustion as superfluous.

Various curves illustrated that a somewhat involved and delicate balance is necessary to insure the desired atmosphere and that it can only be obtained by proper instrumentation at the furnace. These curves show that whether the atmosphere is oxidizing, reducing, carburizing, or decarburizing depends on the CO_2-CO ratio, the H_2O-H_2 ratio, the CH_4-H_2 ratio, and the percentage of carbon in the steel.

A curve by Sykes illustrates that at 1475° F., for perfect neutrality to 0.95% C steel, a ratio of 20 to 1 between hydrogen and methane is required. The Murphy and Jominy curve for H_2O-H_2-Fe shows that at 1475° F. scaling due to H_2O will result unless H_2 is present in at least twice the amount of H_2O; however, in this case the higher the temperature the less hydrogen is required.

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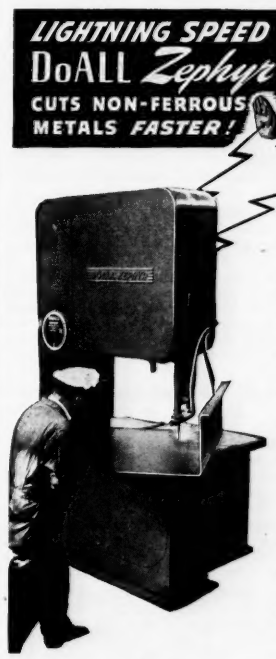

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A.S.M. Review of Current Metal Literature—*Continued*

21. CLEANING & FINISHING (*cont.*)

21-148. **Superfinish—To Date.** M. W. Petrie. *Tool Engineer*, v. 14, Nov. '44, pp. 86-87.
Cutting tools, as well as other small parts, are added to the list of superfinished products. One result of increasing application is a growing emphasis on the need for finish measurement standards.

21-149. **The Size Characteristic of Polishing Abrasives.** Henry R. Power. *Products Finishing*, v. 9, Nov. '44, pp. 66-68.
The importance of size uniformity for polishing grains.

21-150. **Modern Metal Cleaning Processes.** *Metal Treatment*, v. 11, Autumn '44, pp. 179-188.
Cleaning problems encountered in every-day production.

22. WELDING, BRAZING AND FLAME CUTTING

22-511. **Brazing Pump Assemblies.** G. Eldridge Stedman. *Steel*, v. 115, Oct. 30, '44, pp. 96, 98, 101, 127.
Because of its principle of "squeezing" water, new Peerless pump raises water efficiently from almost any depth. First juncture in production of double case for the submersible pump is silver brazing the overlapping ends of the outer case.

22-512. **Researches in Alloy Steel Welding.** D. Hanson, A. H. Cottrell, K. Winterton, J. A. Wheeler, and P. D. Crowther. Institute of Welding *Transactions*, v. 7, July '44, pp. 43-44.
Structure and properties of austenitic steel single-run and multi-run welds. Temperature and mode of initiation of hardened zone cracking. Quantitative measurement of the transverse stress across butt-welded joints, and its formation and development during and after welding. Analysis made of the effect of "local stresses," formed in the hardened zone. Result discussed from a theoretical point of view in order to establish a theory of cracking. 4 ref.

22-513. **A Note on the Initiation of Hardened Zone Cracks.** A. H. Cottrell. Institute of Welding *Transactions*, v. 7, July '44, pp. 54-56.
Method involving the release of restraint at a definite temperature; study of cracking phenomena by means of magnetic flux changes.

22-514. **A Quantitative Study of the Stress Cycle Across Butt-Welds.** K. Winterton and J. A. Wheeler. Institute of Welding *Transactions*, v. 7, July '44, pp. 56-68.
Rectangular frame designed, within which two welding plates can be rigidly restrained. The transverse stress set up when these plates are welded together has been continuously measured during and after welding, by means of a mechanical extensometer (with optical lever) mounted on one of the plates perpendicular to the direction of welding. 11 ref.

22-515. **A Note on the Effect of Local Stresses on Mechanical Properties.** A. H. Cottrell. Institute of Welding *Transactions*, v. 7, July '44, pp. 69-71.
Observed breaking stress and ductility may, under suitable circumstances, be reduced by the presence of local stresses. The reduction in the breaking stress is more profound, the greater is the intensity of the local stresses and the less is the ductility. Effect of ductility upon the breaking stress, for a given local stress, is most important; if the ductility of the material is greater than about 1%, the breaking strength value is fairly insensitive to the presence of local stresses.

22-516. **The Problem of Hardened Zone Cracking.** D. Hanson, A. H. Cottrell, K. Winterton, and J. A. Wheeler. Institute of Welding *Transactions*, v. 7, July '44, pp. 71-74.
Hardened zone failure occurs under the combined influence of local stresses. Mutual reinforcement by stresses of these two types is only possible in materials having extremely low ductilities; such a condition is produced in the hardened zone by its overheating during welding. Explanation is provided of the alleviation of base-plate cracking by pre-heating, delayed cooling, lining, reduction of the plate-metal carbon content and the use of mild steel and austenitic steel electrodes.

22-517. **A Suggested Cause and a General Theory for the Cracking of Alloy Steels on Welding.** G. L. Hopkin. Institute of Welding *Transactions*, v. 7, July '44, pp. 76-78.
Resume of reports issued by the Armament Research Department, Ministry of Supply. A suggested cause for the cracking of alloy steels on welding, by G. L. Hopkin, March '42. The welding of high alloy high tensile steels with ferritic electrodes with controlled hydrogen coating, by G. L. Hopkin and E. L. Evans, August '43. A general theory on the cracking of alloy steels on welding by G. L. Hopkin, Dec. '43. 4 ref.

22-518. **Flame-Cutting in the Shipyard.** G. M. Boyd. Institute of Welding *Transactions*, v. 7, July '44, pp. 79-94.
Process; "crabbing" device; profilers; tracing devices; photoelectric machine; flame planers; supports accuracy; distortion; bevel cutting; "rip and trim cutting"; stack cutting; layout; economics; drag. 22 ref.

22-519. **The Arc Welding of High-Tensile Alloy Steels. II.** E. C. Rollason. *Welder*, v. 13, Jan.-June '44, pp. 6-9.
Shrinkage strains and stresses; effect of three-dimensional tension; design; cracking; cracking tests; prevention of cracks; electrodes; welding technique; preheating; post-heating; sequence of welds; mechanical properties.

22-520. **The Design of Continuous Beams and Frameworks, VII.** H. V. Hill. *Welder*, v. 13, Jan.-June '44, pp. 10-20.
Building frames.

22-521. **Wrought Aluminum Alloys and the Application of Resistance Welding.** *Welding*, v. 12, Oct. '44, pp. 450-455.
Weld inspection, strength properties of welds, and the design of suitable joints.

22-522. **The Arc Welding of High Tensile Steels.** H. F. Tremlett. *Welding*, v. 12, Oct. '44, pp. 440-445.
Metallurgical aspects. A scheme is suggested which should enable the welder to select a procedure that would, in the majority of cases, eliminate the risk of cracked joints.

22-523. **The Welding Department.** H. Marquand. *Welding*, v. 12, Oct. '44, pp. 456-461.
Planning and control.

22-524. **Stud Welding.** E. Leede. *Welding*, v. 12, Oct. '44, pp. 463-466.
A resistance welding application.

22-525. **Recent Developments in the Welding of Light Metals.** W. K. B. Marshall. *Welding*, v. 12, Oct. '44, pp. 472-480.
Corrosion resistance of light alloy welds; improvements in gas welding equipment; arc welding; metallic-arc welding in general applications; carbon arc welding; Heliarc welding. 5 ref.

22-526. **Hard-Facing Materials Applied to Tool Work.** C. E. Phillips. *Tool & Die Journal*, v. 10, Oct. '44, pp. 101-103, 214.
Properties and correct procedures for applying the numerous hard-facing materials.

22-527. **Spot-Welding.** *Aircraft Production*, v. 6, Oct. '44, pp. 474-478.
Equipment used; electrode tips; cleaning of material; inspection and testing; production method applied to Aero Lancaster components.

22-528. **Welding Magnesium Structures.** V. H. Pavlecka and J. K. Northrop. *Aircraft Production*, v. 6, Oct. '44, pp. 501-504.
Details of Heliarc process for joining aircraft parts.

22-529. **Simplifying Light-Alloy Welding.** *Light Metals*, v. 7, Oct. '44, pp. 463-464.
Summary of a new range of proprietary filler rods and electrodes for use in the welding of aluminum-base alloys.

22-530. **Fixtures Speed Welding of Magnesium Wing Tips.** Leslie M. Byars. *American Machinist*, v. 88, Nov 9, '44, pp. 91-93.
Planned tooling aids in the working of sheet magnesium for Northrop's new night fighter.

22-531. **Welded Railroad Rails.** Clyde B. Clason. *Welding Engineer*, v. 29, Nov. '44, pp. 40-43.
The three chief welding methods — oxy-acetylene pressure, flash and thermit. 6 ref.

22-532. **Helium-Shielded Arc Welding.** Francis H. Stevenson. *Welding Engineer*, v. 29, Nov. '44, pp. 44-47.
The use of the inert-gas-shielded welding process for stainless steel exhaust collectors.

22-533. **Progress in Automatic Arc Welding.** R. F. Wyer. *Machinery*, v. 51, Nov. '44, pp. 148-154.
Improved automatic arc-welding machines and equipment are capable of reducing costs, increasing production, and improving quality of product.

22-534. **Low-Temperature Silver Brazing Used in Making Chemical Mortar Shells.** Harry R. Lebkicher. *Machinery*, v. 51, Nov. '44, pp. 155-159.
Uses; operation; advantages.

22-535. **Electric Furnace Brazing Being Widely Extended.** H. M. Webber. *Iron Age*, v. 154, Nov. 16, '44, pp. 48-52.
Stampings brazed to each other or to screw machine parts have replaced other methods of fabrication in the manufacture of ordnance and aircraft components.

22-536. **Welding as an Aid in Shipbuilding Construction.** Howard L. Vickery. *Welding Journal*, v. 23, Nov. '44, pp. 1011-1014.
Success judged from delivery of adequate tonnage when most needed; usefulness of the vessels; ability of the vessels to stand up to wartime service; cost to the taxpayer.

22-537. **Proposed Recommended Practices for Resistance Welding.** *Welding Journal*, v. 23, Nov. '44, pp. 1015-1019.
Standard methods for mechanical testing of resistance welds.

22-538. **Metallic Arc Welding Electrodes, I, II, III.** Harold Lawrence. *Welding Journal*, v. 23, Nov. '44, pp. 1020-1030.
Stainless steel electrodes; hard surfacing electrodes; cast-iron electrodes.

22-539. **The Welding and Heat Treating of Couplers and Other Car Parts.** John McMullen. *Welding Journal*, v. 23, Nov. '44, pp. 1041-1047.
History of change in AAR regulations and the methods used at Erie in reclaiming cracked couplers on a production basis.

22-540. **Shrinkage Distortion in Welding.** W. Spraragen and M. A. Cordovi. *Welding Journal*, v. 23, Nov. '44, pp. 545-s-559-s.
Butt welds; beads of weld metal; fillet welds; plug welds; spot welds; shrinkage distortion in structural welding; methods of controlling distortion due to welding; measurements of distortion during welding and cooling; flame cutting. 46 ref.

22-541. **A Physical Examination of Welds Made From Austenitic Steel Electrodes.** D. Hanson, A. H. Cottrell, K. Winterton, and P. D. Crowther. *Welding Journal*, v. 23, Nov. '44, pp. 574-s-583-s.
Microscopic studies have been made of single run austenitic welds in an endeavor to explain their resistance to cracking. Butt weld tests on multi-run 18-8 welds gave severe interface cracking, which was overcome by means of lining. These facts were investigated by microscopic examination and mechanical tests. Austenitic steel electrodes are considered to be resistant to base plate cracking because the hardened zone is toughened by arms of retained austenite. Interface cracking is ascribed to high stresses promoted by low ductility of the 18-8 multi-run weld metal, this being due to the effects of carbide precipitation and to triaxial stresses. Cracking was successfully avoided in some ferritic steel multi-run welds by lining the welding V with mild steel weld metal. 9 ref.

22-542. **A Suggested Cause and a General Theory for the Cracking of Alloy Steels on Welding.** G. L. Hopkin. *Welding Journal*, v. 23, Nov. '44, pp. 606-s-608-s.
Resume of various reports issued by the Armament Research Department, Ministry of Supply. 4 ref.

22-543. **Routine Inspection and Salvage of Defective Machinery Weldments.** James W. Owens. *Steel*, v. 115, Nov. 20, '44, pp. 105-106, 108, 150, 152, 154.
Need for sound planning to establish operator training, inter-departmental responsibility and use of proper equipment emphasized. New approaches to metallurgical aspects of salvage welding outlined.

22-544. **Factors in Machine Base Design.** F. C. Kardevan. *Industry and Welding*, v. 17, Nov. '44, pp. 35-36, 88-90.
Only when all factors in welding organization and planning are covered can satisfactory and efficient operation be expected.

22-545. **Studding of Cast Iron.** R. Kraus. *Industry and Welding*, v. 17, Nov. '44, pp. 36-39.
New combination of studding, electric welding and bronze welding.

22-546. **Longer Tip Life for Spot Welding Aluminum.** Earl D. Crawford and C. Weston Steward. *Industry and Welding*, v. 17, Nov. '44, pp. 40-41, 44, 94.
Improvement in spots-per-tip-cleaning made with a specially contoured tip.

22-547. **Hints on Hard-Facing Procedure.** *Industry and Welding*, v. 17, Nov. '44, pp. 46-47.
Basic procedures.

22-548. **So—You Want to Own Your Own Shop. Part II.** E. S. Wheeler. *Industry and Welding*, v. 17, Nov. '44, pp. 48-50, 52.
Equipment and shop layout hints to job shop operators.

22-549. **Electric Furnace Brazing.** Lawrence Jacobsmeyer. *Industry and Welding*, v. 17, Nov. '44, pp. 54-58, 77.
If your product can receive the special designing necessary to use this process advantageously electric furnace copper brazing will show astounding profit possibilities.

22-550. **Blazing the Trail with Welded Construction. Part II.** G. S. Storatz. *Industry and Welding*, v. 17, Nov. '44, pp. 60-62.
Moldboard assembly, A-frame assembly.

22-551. **A Makeshift Makes Good.** H. B. Ford. *Industry and Welding*, v. 17, Nov. '44, pp. 64-68.
A product welded in the old cast steel design—and it's lighter, stronger, more economical to make and operate.

22-552. **Electric Furnace Brazing Being Widely Extended.** H. M. Webber. *Iron Age*, v. 154, Nov. 23, '44, pp. 52-56.
Examples of where electric furnace brazing has been able to produce stronger and less costly components for ordnance and aircraft than formerly obtained. A new type of combination brazing and heat treating furnace also described.

22-553. **Fabrication and Reclamation in Steel Mill Maintenance.** F. W. Gruber. *Welding Journal*, v. 23, Nov. '44, pp. 1031-1040.
Description of a welding department in a steel mill. Making the mill almost self-sufficient in providing for all repair, reclamation, replacement and original construction needs.

23. INDUSTRIAL USES AND APPLICATIONS

23-298. **Malleable Cast Iron, IV.** J. A. Wylde. *Metallurgia*, v. 30, Sept. '44, pp. 245-248.
Makes comparisons with competitive materials, with a view to facilitating the choice of the designer or production engineer, and refers to some of the more important applications of malleable iron castings.

23-299. **Metallurgical Data on German Engines.** *Aircraft Engineering*, v. 16, Sept. '44, pp. 248-252.
Light alloy pistons. II. Light alloy cylinder heads. Description of samples; chemical composition; mechanical properties; hardness tests; macrostructure; microstructure.

23-300. **Aluminum and Magnesium in the Electrical Industries.** B. J. Brajnikoff. *Light Metals*, v. 7, Oct. '44, pp. 471-479.
Aluminum production at Alcoa plants and at Arvida, and the electrical equipment associated with it. 4 ref.

23-301. **Aluminum in the Chemical Industries.** *Light Metals*, v. 7, Oct. '44, pp. 483-496.

23-302. **Light Alloys in Metal Rectifiers and Photocells.** *Light Metals*, v. 7, Oct. '44, pp. 505-512.
Copper oxide and caesium types of photocells.

23-303. **Stud Link Anchor Chain.** *Canadian Metals & Metallurgical Industries*, v. 7, Oct. '44, pp. 38-39.
Welded 2 1/16-in. chain for merchant ships.

23-304. **New Aluminum Alloys and Processes.** Hiram Brown. *Aluminum & Magnesium*, v. 1, Oct. '44, pp. 24-27, 39.
The development of alloys on the aluminum-zinc-magnesium base. Uses of these new alloys have included sand, plaster, and centrifugal casting, rolled sheet, and other wrought and extruded products. 3 ref.

23-305. **Tips on Self-Lubricating Bearings.** *Aero Digest*, v. 47, Oct. 15, '44, pp. 116, 152.
Manufacturing technique; avantages.

23-306. **Postwar Outlook for Castings.** *Foundry*, v. 72, Nov. '44, pp. 92-93, 194, 196.
A study of expected choice of materials in postwar product design indicates sustained or increased use of castings by most consumers. Preferences vary in different industries and according to size of plant.

23-307. **Metlbond—A Metal Adhesive for Aircraft.** G. G. Havens. *Mechanical Engineering*, v. 66, Nov. '44, pp. 713-714, 736.
Development of metal adhesives; theory of adhesion; Metlbond combines several adhesives; special applications.

23-308. **Gage Devised for Counting Commutator Bars.** J. I. Karash. *American Machinist*, v. 88, Nov. 9, pp. 94-95.
Simple device is made of a tube ring with gaging teeth cut on each end. Method for counting bars is fast and more accurate.

23-309. **Thermit Branches Out.** Kenneth Rose. *Scientific American*, v. 171, Nov. '44, pp. 199-201.
Intense heat (above 4500° F.) is generated by reaction of granular metals when correctly ignited. The heat alone can be applied to many uses, or the resulting metallic mass can be used for construction or repair purposes. Major trends are now in view.

23-310. **Blade Fabrication.** *Tool Engineer*, v. 14, Nov. '44, pp. 77-83.
Establishing centers in forging; visual inspection of contours; hand grinding for finish; brazing the propeller blade; sealing the blade.

23-311. **60,000,000 Die Castings Can't Be Wrong.** H. E. Musselman. *Die Casting*, v. 2, Nov. '44, pp. 24-25, 60.
Die castings have more than shape. They have dynamic qualities that are often overlooked by the busy engineer who has not had the opportunity to discover their structural advantages. Die castings in precision lathes.

23-312. **Fire Bombs—an Old Weapon Brought Up to Date.** S. E. Whitesides, Jr. *Die Casting*, v. 2, Nov. '44, pp. 30-31.
The advantages of die casting as a means of rapidly producing great quantities of duplicate precision parts.

23-313. **Where Die Castings Are a Life and Death Matter.** J. A. Smeller. *Die Casting*, v. 2, Nov. '44, pp. 32-35.
Oxygen regulators that guard the breathing apparatus for airplane crews must be absolutely leak-proof at pressures of 50 psi. Tests also include corrosion, vibration, temperature checks.

23-314. **Die Castings for Cool Heads.** Fred M. Burt. *Die Casting*, v. 2, Nov. '44, pp. 36-37, 60.
The die casting of parts for oil cooling systems.

23-315. **Notes on Synthetic Rubber and the Necessary Equipment.** Myron Weiss. *Metal Progress*, v. 46, Nov. '44, pp. 1091-1096.
Brief account of a war effort that would be impossible without a generous supply of proper metals for the manufacturing equipment.

23-316. **The Production of the Merlin Engine.** *Machinery* (London) v. 65, Oct. 19, '44, pp. 421-427.
Rolls-Royce methods at a Ministry of Aircraft Production Factory.

23-317. **Steel Castings in Aircraft.** J. F. B. Jackson. *Aircraft Production*, v. 6, no. 67, May '44, pp. 207-209. *Engineers' Digest*, v. 1, Oct. '44, pp. 614-615.
Designing; properties.

23-318. **Piston Ring and Cylinder Wear in Automobile Type Engines.** P. V. Lamarque. Report No. 1942/10, Automobile Research Committee, The Institution of Automobile Engineers. *Engineers' Digest*, v. 1, Oct. '44, p. 630.
Cylinder wear and related problem of oil consumption.

23-319. **Metallurgical Warfare.** G. L. Cox. *Army Ordnance*, v. 27, Nov.-Dec. '44, pp. 478-480.
Production of high quality steel for ordnance materiel.

24. DESIGN

24-55. **Redesign Bearing Separators to Lighten Weight of Navy Equipment.** S. R. Thomas. *Steel*, v. 115, Oct. 30, '44, pp. 78, 80.
Channel-shaped, rolled steel bearing retainer rings and gun-mount bearing separators of alternate material effectively reduce overall ship weights to permit heavier armor plating.

24-56. **Designing Aluminum Sand Castings.** R. Irmann. *Light Metal Age*, v. 2, Oct. '44, pp. 18-22.
Pictorial outline of right and wrong fundamental designs.

24-57. **Rigidized Sheet Metal Lightens Panel Design.** Dimitry E. Olshevsky. *Product Engineering*, v. 15, Nov. '44, pp. 741-744.
Development of a method for substantially increasing flexural strip rigidity of sheet metal in all directions by impressing carefully designed patterns of beads and ridges offers a new approach to weight reduction of panel structures.

24-58. **Design Rules—IX.** Herbert Chase. *Die Casting*, v. 2, Nov. '44, pp. 38-41.
Take advantage of cast threads. Design toothed or irregular shaped contours for die casting rather than machining.

25. MISCELLANEOUS

25-256. **British Metallurgical Institutes and Research Associations.** J. W. Donaldson. *Metallurgia*, v. 30, Sept. '44, pp. 251-254.
A general resume of the work of the institutes and research associations directly connected with metallurgical research work, and brief reference is made to some of the work carried out.

25-257. **Automatic Indexing Fixtures.** *Machinery* (London), v. 65, Sept. 28, '44, pp. 347-349.
Mechanically, electrically and pneumatically operated to enable accurate work to be performed at high speed.

25-258. **Ball and Roller Bearings.** L. Rosenfeld. *Automobile Engineer*, v. 34, Oct. '44, pp. 421-425.
A survey of various factors affecting friction. 14 ref.

25-259. **Material Weight Tables, Part VI.** *Tool & Die Journal*, v. 10, Oct. '44, pp. 107-111.
Calculating the total weight of steel.

25-260. **On the Mechanism of Friction.** Bernhard W. Sakmann and John T. Burwell. *Journal of Aeronautical Sciences*, v. 11, Oct. '44, pp. 381-386.
Reports the dependence of transfer of material on various parameters such as normal load, distance of travel, roughness and hardness of the sliding surfaces, nature of the contacting materials and lubrication. 7 ref.

25-261. **Postwar Holds Promise for Magnesium Industry.** Edw. S. Christiansen. *Aluminum & Magnesium*, v. 1, Oct. '44, pp. 21, 37.
Formation of the Magnesium Association.

25-262. **Standard Markings.** *Steel*, v. 115, Nov. 6, '44, pp. 120, 166.
Uniform system of markings only provides alphabetical identification for all bond types to designate hardness, special symbols, and single standard system for better consumer-manufacturer understanding.

25-263. **New Crane Hoist System Provides Maximum Speed Combined with Maximum Safety.** M. A. Whiting. *Blast Furnace and Steel Plant*, v. 32, Nov. '44, pp. 1317-1321, 1327.
Characteristics and applications.

25-264. **Research in the Iron and Steel Industry.** D. A. Oliver. *Blast Furnace and Steel Plant*, v. 32, Nov. '44, pp. 1341-1343.
The value of research and its development.

25-265. **Metallurgy of Enemy Aircraft (Me 109).** *Metal Treatment*, v. 11, Autumn '44, pp. 171-177.
Examination of the fuel and header tanks fitted to the Messerschmitt 109.

25-266. **The Light Metals and Plastics and Their Impact on the Steel Business.** L. S. Hamaker. *Industrial Gas*, v. 23, Nov. '44, pp. 15-16, 33-36.
Competition between metals as such, and between metals and plastics.

25-267. **Improved Riveting.** G. Eldridge Stedman. *Steel*, v. 115, Nov. 20, '44, pp. 102-104, 164.
Cuts work, reduces operations, doubles number of rivets that can be placed and headed per hour.

25-268. **Highly Efficient Skid-Load and Power-Truck System Facilitates Production of Hollow Steel Propellers.** George E. Stringfellow. *Steel*, v. 115, Nov. 20, '44, pp. 128, 130, 134.
Effective in moving materials in production of hollow steel propellers is the combination of power trucks, skids, motorized hand trucks and conveyor systems.

26. STATISTICS

26-106. **Texas City Tin Smelter Producing 30,000 Tons a Year; Capacity About 80,000 Tons.** Erwin Vogelsang. *Metals*, v. 15, Oct. '44, pp. 6-9.
For domestic industry to continue in postwar, steps will have to be taken soon to assure supply of concentrates.

26-107. **Magnesium—Today and Tomorrow.** Willard H. Dow. *Aluminum & Magnesium*, v. 1, Oct. '44, pp. 18-20, 42-43.
Present status of government controlled magnesium; and postwar plans of magnesium fabricator.

26-108. **What's the Future of Aluminum?** Stanley V. Malcuit. *Aluminum & Magnesium*, v. 1, Oct. '44, pp. 30-33, 45.
The future of aluminum based on lower price, wider field of aluminum knowledge, technical improvements within the industry and greater quantity of metal available.

26-109. **The Past, Present and Future of Magnesium.** Walter A. Janssen. *Die Casting*, v. 2, Nov. '44, pp. 52-57.
Not always well behaved; price rise in last war; German production; magnesium vs. aluminum; early hesitation to use; this war's influence; present production; world's largest producer; potential surplus available.

26-110. **Industry Cannot Get Along Without Platinum Metals.** Fred E. Carter. *Mining & Metallurgy*, v. 25, Nov. '44, pp. 544-545.
Supply exceedingly small in relation to technical and commercial importance.

26-111. **Some Economic Factors in Metallurgy.** C. B. Snodgrass. *Metal Treatment*, v. 11, Autumn '44, pp. 139-144.
The metallurgical resources of the world tend to be developed, expanded and improved to the fullest extent in wartimes. 13 ref.

27. NEW BOOKS

27-155. **Manual of Machine Shop Practice.** Otis Benedict, Jr. 257 pp., illus. McGraw-Hill Book Co., New York, $1.75.
Helpful material on machine tools, for the student taking a course in engineering shop practice.

27-156. **Handbook for Shipwrights.** H. F. Garyantes. 614 pp., illus. McGraw-Hill Book Co., New York. $5.00.
A guide for shipwrights, reviewing the lines of a ship, the results of welding reaction, and steel construction, and showing, in some detail, the proper lining up of the various parts for structural strength and how to overcome the difficulties that arise when a ship does not conform to the designed lines.

27-157. **Production Handbook.** L. P. Alford and John R. Bangs. 1700 pp., diagrams, Ronald Press Co.. 15 East 26th St., New York 10, N. Y. $7.50.
Organization methods restudied for effective postwar management; job evaluation and merit-rating techniques; time-study, motion-study and training; production planning and control; purchasing; materials control; plant maintenance.

27-158. **Occupational Accident Prevention.** Harry H. Judson and James M. Brown. 234 pp., John Wiley & Sons, Inc., New York. $2.75.
Modern tested methods for preventing industrial accidents and protecting workers.

27-159. **Industrial Radiology and Related Phenomena.** H. M. Muncheryan. 539 pp., illus., Aircraft X-Ray Laboratories, 1600 E. 7th St., Los Angeles 21, Calif. $7.50.
An authoritative guide to modern inspection of aircraft parts, naval structures, and all materials of industry by means of X-rays, gamma rays, micrographic analysis, metallurgical testing, and by Magnaflux methods.

27-160. **Experimental Stress Analysis; Proceedings of the Society for Experimental Stress Analysis, v. II, no. 1,** edited by C. Lipson and W. M. Murray. 225 pp., 8½x11 in., Addison-Wesley Press, Inc., Kendall Square Bldg., Cambridge, Mass. $5.00.
Twenty-one papers presented before the Society's spring meeting in Boston, May 1944, including symposium on residual stresses.

27-161. **Code of Minimum Requirements for Instruction of Welding Operators. Part B-1—Oxy-Acetylene Welding of Steel Aircraft.** American Welding Society, 33 West 39th St., New York 18. $0.50.
Two courses prescribed, one primary and one advanced, with welding exercises and lectures in related welding information prescribed.

27-162. **Glossary of Foreign Welding Terms.** 16-page pamphlet, American Welding Society, 33 West 39th St., New York 18. $0.50.
German, French, Russian and Spanish terms.

A little stick of dynamite can make a big noise but even so it wouldn't create a greater sensation than the new *individually developed* compounds, recently introduced by Mac Dermid Inc., have caused in the metal finishing cycle.

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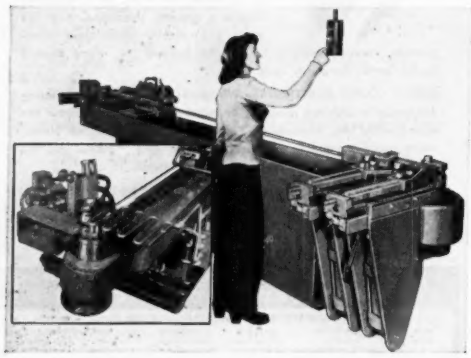
NEW PRODUCTS IN REVIEW

SMALL AUTOMATIC BENDER

Pines Engineering Co., Aurora, Ill.

A new small size, high speed, full automatic bender for handling tubing up to 1 in. o.d., has been developed by this company. Designed especially for the tubular furniture, refrigeration and heating industries, where high production bending of small diameter tubing is required, this bender, when equipped with a multiple angle selector, will make up to 50 tubular chairs per hour with eight bends in each chair.



A special application has been developed for making serpentine coils. It incorporates a booster attachment for automatically advancing the coil to position for the next bend. The bender completes the entire cycle and returns to starting position, including automatic ejection, through momentary contact of the start button. Production up to 600 bends per hour in coils from ⅝ in. o.d. copper tubing are thus made. An eight-page catalog describes the five sizes of automatic benders.

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METAL PARTS WASHER

Phillips Mfg. Co., 3425 W. Touhy Ave., Chicago 45, Ill.

This three-stage metal washing tank, designed for use with an emulsifying cleaner or as an alkali washer, comprises a heated solvent tank with two heated water rinse tanks.

The heated solvent tank offers a thermostatically controlled range from 135 to 250° F. and a drain board which conducts the "drag-out" solvent back into its tank. After immersion in the cleaning agent and draining, the parts are immersed in the first, then the second rinse tanks, emerging completely free of oil and dirt. The water rinse is also heated, with a controlled flow that keeps the temperature at about 180° F., and an ingenious arrangement provides for the removal of most of the dirt and oil in the first rinse so that the final one produces oil-free work.

The solvent tank is heated by strip heaters and the water rinse by immersion heaters. Tank walls are insulated and working parts are easily accessible. Two safety covers hang at the side of the tank when not in use and protect the operator from contact with the tank itself.

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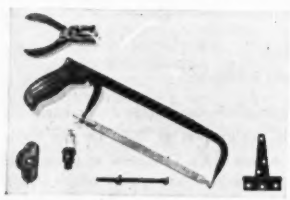
BLACKENING PROCESS

Turco Products, Inc.,
6135 S. Central Ave., Los Angeles 1, Calif.

Ferrotoning, a new, simpler chemical blackening finish for ferrous parts, utilizes simple immersion equipment which can be set up quickly in small manufacturing or plating plants with equipment that is already available or obtainable at very small cost. The Ferrotone bath operates at a temperature considerably below that required by oxide finishing baths. No longer is it necessary to maintain two oxidizing solutions as required in most processes, the manufacturers claim.



Ferrotoning, an entirely chemical process, provides a gleaming black or rich matte finish which is integral with the metal itself and is extremely durable. It does not chip, flake or peel off even under repeated flexing. It will not blister and cannot be removed under routine cleaning operations by the action of solvents or degreasing agents. The Ferrotone process neither increases nor decreases the dimensions of the treated metal.

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ELECTRIC CONTROLS

Brown Instrument Co., Philadelphia, Pa.

Introduction of electric contact controls for circular chart electronic potentiometers is announced by this company. The controllers will be available in two forms. One will contain a locking-in type relay, designed primarily for electric furnace control. It can also be used for applications involving use of contactors and for processes requiring a differential gap. The second type, without a relay, is designed for direct control of motorized valves, operation of signalling devices, and for applications requiring a "dead" neutral.

The electric contact control mechanism will be available for circular potentiometer pneumatic controllers. It will serve, when applied to these instruments, as an auxiliary switch for operation of signal lamps and other devices.

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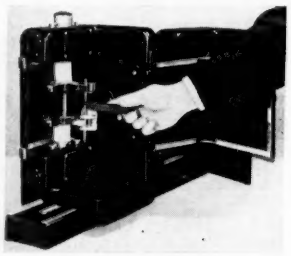
ARC-SPARK STAND

Harry W. Dietert Co.,
9330 Roselawn Ave., Detroit 4, Mich.

This "Universal Arc-Spark Stand" is said to be truly universal because it combines all of the desirable features of the conventional stand used in general arc work, of the jig-loaded stand used for metal-rod analysis, and of the Petrey stand used for metal-plate analysis.

The unit is completely enclosed and the door is furnished with a safety switch to obviate the hazard of shock and with a dark red transparent plastic panel which allows good discharge visibility and at the same time provides complete safety for the eyes. The stand is ruggedly constructed from large aluminum castings. Massive steel electrode holders are water-cooled, while specially insulated tubing on the water system prevents power leakage or breakdown even when used with the high voltage spark unit. A unique friction drive for positioning the electrodes insures exceedingly smooth operation and accuracy of adjustment. It provides a 1-in. continuous travel on both the upper and lower holders, a minimum spacing of ⅝ in. between holders and a maximum of 2⅝ in. Calibrated stops limit each electrode holder's motion at top and bottom. These are adjustable to 0.002 in. with a vernier knob thus allowing exact duplication of a wide variety of settings.



For use as a jig-loaded stand, the holders are locked in place and an accompanying jig is used for spacing the sample rods rapidly and accurately. Another jig, also furnished, may be used for spacing rod-carbon electrodes for arc work. A differential tension between the upper and lower electrode holders is maintained so that the upper electrode may be racked against the lower for striking the arc and providing exact spacing. The lower electrode holder takes a full 6-in. length of high purity graphite when that material is used as a counter electrode. Used for a variety of spectographic work in the laboratory, this stand is of rugged construction, making it adaptable also for production work. Over-all dimensions are 9 in. wide, 14 in. high and 8 in. deep. Weight is 30 lb.

Mention R671 When Writing or Using Reader Service.

CLAMPED-ON TOOLS FOR HEAVY DUTY MACHINING

Kennametal, Inc., Latrobe, Pa.

A line of "H.D." tools having clamped-in and advanceable Kennametal tips, for heavy duty machining on steel castings, forgings, and bar stock and cast iron, is now being produced by this company. The H.D. design has been made possible by the development of heavy duty Kennametal tips, that, while overhanging the tool shank by about ⅞ in., have ample strength to take heavy feeds and deep cuts.

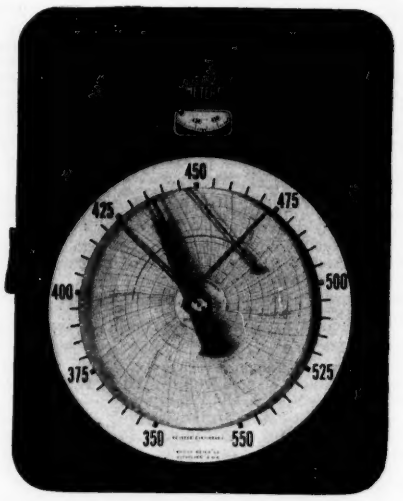
The special type of tip used in the H.D. tool has a clamping shelf along the top of the side opposite to the cutting edge. It is diamond ground on the under side. When dull, the tip is advanced, and resharpened. The tip may be reground many times, since it is advanced to the front and side, in the oblique recess, until the major part of it has been utilized. Only the cutting edge is ground, and no steel is removed in the process. The recess in the hardened steel shank is finished plane and true with a Kennametal-tipped fly cutter or an end file. The clamp and set screw, positioned to avoid abrading, permit smooth, unimpeded chip flow.

Mention R672 When Writing or Using Reader Service.

ELECTRONIC RECORDER-CONTROLLER

Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland, Ohio.

An electronic resistance thermometer suitable for indicating, recording and controlling temperatures between —100 and 1000° F. is announced by this company. This recorder operates on the highly accurate null balance principle and provides instantaneous balancing action by electronic detection and control. Unbalance of the measuring bridge is detected by electron tubes without the aid of a galvanometer or other moving parts. Reliable performance and accurate calibration over long periods of continuous operation are said to result from this sturdy design.



In the recorder-controller illustrated, a 29-in. indicating scale circles the chart and may be read easily at a distance of 50 ft. The pointer reading coincides with that of the recording pen. Indicating, recording and controlling mechanisms are all driven by the same reversible electric motor which adjusts the slide-wire resistance to balance the measuring bridge. This motor is continuously connected to the electronic control unit which in turn is continuously connected to the measuring bridge.

The electronic resistance thermometers may be provided with as many as four recording pens, each one being provided with its own continuously connected electronic control unit and measuring bridge. This feature insures instantaneous response to temperature change.

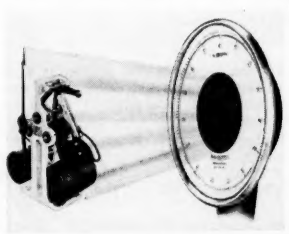
Alarm contacts may be provided for any or all of the recorder units. These contacts are operated by an adjustable cam which may be set to trip at any desired position of the recording pen.

Mention R673 When Writing or Using Reader Service.

IMPROVED MECHANISM SPEEDS WEIGHING

Kron Scales, Yale & Towne Mfg. Co., Philadelphia, Pa.

The improved Kron ball bearing, springless dial mechanism of the double pendulum type is the precision-built "brain" around which every Kron scale is designed and made. Combining rugged construction with extreme sensitivity, it speeds weighing, counting, batching, measuring and testing operations with accuracy and dependability by reducing these operations to a simplified load and look procedure.



Featuring specially designed ball bearings to eliminate wear at bearing points, the gear sector and shafts carrying the indicator and pendulum arm weights are all mounted in fixed centers.

Mention R674 When Writing or Using Reader Service.

SINGLE WING TANGENT BENDER

Struthers Wells Corp., Titusville, Pa.

The new single wing tangent bender smoothly edge bends sheet metal. This unit will handle practically all work that can be formed on the original double wing tangent bender excepting the heavier duty jobs such as doming the top of refrigerator cabinets.

The single wing is also an improved brake. With proper dies it will bend sheets either with sharp corners or to any desired radius. This new unit is designed to take care of shorter runs and tangent bends requiring more frequent die changes.

The machine is available in three sizes: No. 3, for bending sheets 36 in. maximum width by any length; No. 7, for bending sheets 84 in. maximum width by any length; and No. 10, for bending sheets 120 in. maximum width by any length. Four-page leaflet gives full details.

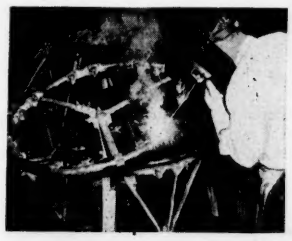
Mention R675 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

HIGH TENSILE ELECTRODE

General Electric Co., Schenectady, N. Y.

A new high tensile arc welding electrode for fabricating aircraft steels has been announced by the electric welding division. Capable of making a deposit of high tensile strength comparable to the mechanical properties of the parent metal, the new electrode, Type W-55, is especially designed for use in the manufacture of heavy bombers and transport planes.



The electrode can be used for welding in any position, including vertical welding from the top down and from the bottom up. The arc can be struck at the top of the joint and maintained while welding vertically downward, then overhead, then vertically upward back to the starting point. Arcing characteristics provide flexibility over a reasonably wide voltage range with stable operation throughout.

Mention R676 When Writing or Using Reader Service.

GRIPMASTER POLISHING

Michigan Bleach & Chemical Co.,
1944 E. Woodbridge, Detroit 7, Mich.

After over two years of research, this company announces a new synthetic polishing wheel cement, "Gripmaster." It is said that tests prove that Gripmaster steps up polishers' production an average of 47% more pieces per head. Due to a secret heat resisting ingredient, Gripmaster does not glaze on the wheel. Moreover, its remarkable new adhesive action locks in the grains of emery with a new positive vice-tight control.

An important time-saving and inventory-reducing advantage on which a patent is now pending, is that all grains—250 to 20—may now be applied with just one grade of cement. Users report that it is possible to oil out with Gripmaster, an operation that formerly required a special adhesive. Nor is a special sizer necessary. With the addition of water only, Gripmaster serves as its own sizer.

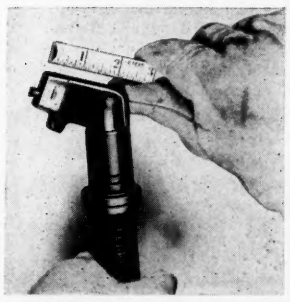
Plant tests devoted to the special problem of drying have established that Gripmaster dries quickly at room temperature. Plants making these tests report that they find the extra oven-heating operation can now easily be dispensed with. Its great flexibility permits this cement always to assume the contour and shape of the wheel, with resulting improvement in quality of the polishing.

Mention R677 When Writing or Using Reader Service.

SHORTSTUB ELECTRODE HOLDER

National Cylinder Gas Co.,
205 W. Wacker Dr., Chicago 6, Ill.

A new electrode holder is designed to allow unobstructed visibility while welding and maximum accessibility even for deep pocket work, fast loading and reloading, plus the war-necessary feature of more completely using up the electrode.



Because dollar losses in electrodes have averaged 7%, the Hollup Corp. of Chicago, a division of National Cylinder, developed a new "Shortstub" electrode holder designed to increase the usable portion of the electrode to a point right up to the uncoated end of the rod. With this holder, only ½ in. is needed for a tight, efficient current contact in the holder jaw. An extension of the holder itself allows the now usable stub end of the rod to be projected into the proper position for welding.

Mention R678 When Writing or Using Reader Service.

COLORING OF METALS

Technical Processes Div., Colonial Alloys Co.,
Philadelphia 29, Pa.

Steel, copper, aluminum and other ferrous and nonferrous metals may be colored by simple processes of chemical immersion. A long range of colors is possible in iridescent and matte effects. Many of the coloring baths also increase the corrosion resistance of the metal being treated.

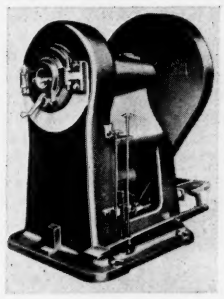
Coloring salts or solutions are furnished with instructions for their use. Metal preparation and cleaning instructions are also given. This company will color and return for evaluation customers' metal specimens.

Mention R679 When Writing or Using Reader Service.

PRODUCTION INCREASED BY NEW AUTOMATIC DIE OPENING CABLE SWAGER

Standard Machinery Co., Providence 7, R. I.

The cable swager produced by this company and widely used by aircraft plants has been redesigned into a fast automatic die opening and automatic feeding unit requiring only 3 sec. for each complete operation. This machine has increased the production rates obtained in the attachment of fittings to cable as much as 15 times, through the use of its quick acting die opening device and its automatic feed. The cable swager delivers a positive relation between cable and fitting in the processing, makes it a one-man operation, and eliminates the necessity for removing the dies for each cable swaging operation using large end fittings.



This cable swager uses the rotary swaging action for working the shank metal of the fitting around the cable strands but the operation is simplified by its hand control for opening and closing the dies from the front of the machine while it is running at the normal flywheel speed. The clearance when the dies are opened is sufficient to accommodate all standard types of fitting attachments.

Four sizes are offered to handle cable sizes from ⅛ in. to 1½ in. There are many operations in production manufacture that can economically use this machine. For example, a shank fitting may be tightly swaged around a rod or tube, or the tubing can be attached to a pin type fitting.

Mention R680 When Writing or Using Reader Service.

INSULATION GUN

Illinois Clay Products Co.,
608 S. Dearborn St., Chicago 5, Ill.

Open-hearth operators are now offered a new gun designed to speed the sealing and insulating of open-hearth walls and bulkheads. This gun syphons dry Therm-o-flake insulation direct from the shipping carton, mixes with water and sprays to the refractory wall in one operation. Premixing is eliminated. Application is six to eight times faster than by manual methods.

The gun operates on standard air and water pressures. It weighs but 4 lb. and can be moved about as easily as a man can walk. Units are shipped complete with 15-ft. sections of air, water and vacuum hose and all necessary valves and fittings. Descriptive literature is available.

Mention R681 When Writing or Using Reader Service.

MICRO-KING BORLOCATOR

Steel Tools, Inc., 2307 Prospect Ave., Cleveland 16, Ohio.

Accepted as an important contribution to speed, accuracy and economy in production and inspection, the Micro-King Borlocator is best described as a method which makes possible quick and accurate assembling of a wide variety of production and inspection jigs and fixtures. It is an ingenious yet highly practical answer to the need for "prefabricated" jigs and fixtures.

Consisting of a set of 150 precision components, the Borlocator includes master location plates that can be assembled to conform to any layout by means of special locking clamps and screws; combinations of drill jig bushings, drill bushing adapters, and lock screws are mounted on the location plate according to the specified center distances of the holes to be drilled.

Locating pins are inserted in the drill bushing before the final "locking up" of the assembly of location plates and bushings. With a vernier caliper set for hole center-to-center distance plus one-half the diameters of the respective locating pins, measurements are made "over the pins" of any pair of bushings and a light tapping of one bushing plate permits locating to the final thousandth.

So that the fixture will locate properly and uniformly on a given run of castings or work pieces, adjusting blocks and screws are provided which may be positioned at appropriate locations around the outside of the whole assembly. Borlocators are being used for inspection fixtures as well as production jigs. By means of a master assembly of bushings and pins set up as a multiple plug gage, inspections may be made of hole center locations; and by means of the adjusting or positioning blocks the hole locations may be checked relative to the outer edges of the work piece.

The location plates are chromium plated and are precision made—straight, parallel, and square. They may be assembled end to end, side by side, or end to side. To insure accuracy and rigidity, the interlocking grooves of the plates incorporate a half-wedge in their cross-section so that when two plates are mated a full wedge is formed. The result is that the contacting areas of any two locked plates are under compression.

Mention R682 When Writing or Using Reader Service.

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CHECK THESE NUMBERS FOR PRODUCTION INFORMATION AND MANUFACTURERS' CATALOGS

Use this convenient method to obtain further information on items of interest to you in THE METALS REVIEW. The following numbers refer to the new products, manufacturers' literature and advertisements in this issue.

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MANUFACTURERS' CATALOGS IN REVIEW

Polishing and Burring

Divine Brothers Co., Utica, N. Y.

A light duty lathe for small parts polishing and burring is described in this bulletin. Known as the VJ lathe, it is a V belt-driven unit with motor sizes up to 3 hp., and spindle speed range to a top of 3850 rpm. The lathe may be used with taper spindle extensions for bob work. Two sealed-for-life spindle bearings of ample capacity eliminate the need for periodic lubrication of spindle bearings. Starter is mechanical push-button type with thermal overload relays for motor protection.

Mention R683 When Writing or Using Reader Service.

Weight Calculator

Lukens Steel Co., Coatesville, Pa.

A combination steel plate weight calculator and size selector has been developed for use by engineers and users of steel plate or equipment made of steel plate. The device is believed unique because of the wide range of gages, widths and lengths of steel plate for which weights can be calculated.

With the steel plate weight calculator, which operates somewhat like a slide rule, can be determined quickly the theoretical weight of any steel plate from 10 to 200 in. in width and from 3/16 to 6 in. thick. With the steel plate size selector can be determined the longest and widest steel plate obtainable for any desired thickness. Included with the selector is an imprinted table giving decimal equivalents and weights which will be of value to users of the device.

Mention R684 When Writing or Using Reader Service.

Ribbon Type Heating Units

Harold E. Trent Co., Leverington Ave. and Wilde St., Manayunk, Philadelphia 27, Pa.

This four-page leaflet describes the Trent folded and formed ribbon type high temperature electric heating elements, showing a number of uses particularly for chemical applications. Illustrated are items that have proven interesting to steel mills, laboratories and plants together with other Trent products from heating units to large conveyor furnaces.

Mention R685 When Writing or Using Reader Service.

High Temperature Insulating Cement

Universal Zonolite Insulation Co.,
135 S. La Salle St., Chicago 3, Ill.

This eight-page leaflet on Zonolite high temperature insulating cement gives composition, characteristics, uses, specific applications, procedure for applying, coverage, technical data on thermal conductivity, and test results on various mixes in respect to coverage capacity wet and dry, weight of materials, shrinkage, fired shrinkage, hardness, abrasion and cohesive tensile strength.

Heat losses and outside temperatures for various thicknesses of Zonolite cement at different hot face temperatures are charted, and there are tables showing the results of applying Zonolite cement to both insulating refractory brick walls and firebrick walls. In addition there is much information of a general nature including computation method for economical thickness of insulation and heat losses, tables of fuel and energy loss per square foot area of furnace walls, pipes, etc., with various fuels and based on various outside surface temperatures.

Mention R686 When Writing or Using Reader Service.

Kodak Linagraph Transfer Paper

Eastman Kodak Co., Rochester 4, N. Y.

This 22-page booklet shows how Linagraph transfer paper can be used to sensitize sheets of iron, steel, terne plate, galvaneal, aluminum, duralumin, alclad, brass, bronze, magnesium alloys, and other materials. Wide use has been found in sensitizing template material for use in photo-copying production of templates. Another application of the Linagraph transfer paper is in the photographic reproduction of instrument dials, name plates and instruction plates. The operations required in the photographic preparation of templates, the materials, equipment and procedure, are comprehensively described in this helpful booklet.

Mention R687 When Writing or Using Reader Service.

Gray Iron Castings Prices

Gray Iron Founders Society,
1201 Nineteenth St. N.W., Washington 6, D.C.

To interpret and clarify the regulation establishing maximum prices for gray iron castings, the gray iron castings industry advisory committee to the Office of Price Administration has issued, with the cooperation of this Society, a special booklet titled "The ABC's of Maximum Price Regulation No. 244."

In a question-and-answer analysis of the regulation's major provisions, part one of the 42-page booklet discusses, in simple language, the coverage of the order, methods by which the seller may determine his maximum prices, short order pricing, formula price recomputation, calculation of overtime addition, sellers' records and reports, and applications for amendment, adjustment or exception. Although it was prepared primarily for producer and seller, the booklet should prove of interest to castings buyers and is available to them.

Mention R688 When Writing or Using Reader Service.

Anhydrous Ammonia

Barrett Div., Allied Chemical & Dye Corp.,
40 Rector St., New York 6, N. Y.

This convenient 16-page booklet describes the physical and chemical properties and some of the principal uses of anhydrous ammonia. Ammonia is cracked or dissociated into its elements and the resulting gases used as a protective atmosphere for bright annealing, powder metallurgy and brazing. Dissociated ammonia also serves as a source of hydrogen for welding and in the production of metal powders.

Mention R689 When Writing or Using Reader Service.

Grinding and Finishing

Minnesota Mining and Mfg. Co., St. Paul, Minn.

Four helpful new publications illustrating and describing the 3-M method of grinding and finishing have been issued by this company. The largest booklet, entitled "Step Up Production with the 3-M Method of Grinding and Finishing," is designed to provide the latest facts and information, with shop photographs covering many grinding and finishing operations. It tells the complete story of abrasive backstand belts and segment face contact wheels with bench backstand idlers, floor model backstand idlers, swing grinders and other high speed units. The booklet includes a formula for determining abrasive belt sizes and placement on backstand idlers. The three smaller booklets deal individually with the 3-M method as applied to the grinding and finishing of small parts and tools, heavy duty grinding and finishing of flat or curved surfaces, and the 3-M method employing a semi-portable unit for grinding and conditioning raw metal stock—armor plate, billets, sheets and tubes—and for cutting down large welding areas.

Mention R690 When Writing or Using Reader Service.

Zero Refractories

Standard Fuel Engineering Co.,
667 S. Post Ave., Detroit 17, Mich.

A high heat duty Missouri clay firebrick under the trade name Zero-Star has been added to this company's line of refractory specialties. This new brick is said to be capable of severe service due to the special grain sizing and blending of clays used in its manufacture. The brick fills a wider range of service conditions and is made especially to meet the increased demand of modern furnace operation. The brick is available in all 9-in. series as well as tile shapes and other special sizes.

Mention R691 When Writing or Using Reader Service.

Dust Masks

Martindale Electric Co., Cleveland 7, Ohio

This leaflet describes the Martindale protective masks and cites scores of applications as well as those operations where these masks, which weigh only ½ oz., should not be used. Uses include spraying non-toxic paints and lacquers, grinding with artificial abrasive wheels, and polishing aluminum.

Mention R692 When Writing or Using Reader Service.

Resistance Welding at Work

Progressive Welder Co.,
3050 E. Outer Drive, Detroit 12, Mich.

This 60-page book contains scores of illustrated examples of resistance welding applications. It is a striking commentary on the tremendous increase in scope and application of resistance welding during the war and immediate prewar years. It is designed primarily as a guide to the wide variety of uses to which resistance welding adapts itself—whether it be single spot or multiple spot, seam or flash, butt or projection welding—and whether the work is to be brought to the machine or the equipment brought to the work in fixtures. In this book there is an answer by examples of how it is being done to practically every general type of resistance welding problem encountered and equipment required.

Mention R693 When Writing or Using Reader Service.

Working Principles of Electric Arc Welding

Harnischfeger Corp., Milwaukee 14, Wis.

This 72-page manual provides a wealth of authentic information on electric arc welding. Compiled by Harnischfeger engineers with the cooperation of the American Welding Society and other technical groups, the book is written for welding operators as well as for design engineers. For the former, it provides a handy source of essential and practical information to help improve the quality of their work and gain advancement. For the design engineer, it interprets the basic principles of modern electric welding and its advantages and opportunities in terms of improved design and construction in products. The entire content is treated with a minimum of technical language. Arc phenomena, for example, are effectively explained in a few short paragraphs. This feature and the series of exercises and instructions on various types of welds make the volume ideal for shop trainees. An introductory message points to the ever-widening application of arc welding because of the saving in weight, reduction in fabricating costs, and improvement in design that it makes possible. An outstanding user of welding in its own plants on a wide range of products, this company manufactures a complete lines of a.c. and d.c. welders and welding electrodes and positioners. Copies of this book are available at $1.00 each.

Mention R694 When Writing or Using Reader Service.

Arc Welding Electrodes

Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

A new bulletin on arc welding electrodes gives a complete description of each electrode in the company's line. It includes separate charts on physical properties of weld metal for each electrode as well as on recommended current values. The electrodes are both a.c. and d.c. types and are easily identified by official A.W.S. classification numbers.

Mention R695 When Writing or Using Reader Service.

Conveyor Foundry Oven

Despatch Oven Co., Minneapolis 14, Minn.

This four-page bulletin describes a horizontal type foundry oven designed with four levels of horizontal core travel. The cores are loaded in the open section and then travel vertically to the baking oven at the top where they make two horizontal passes in the heating system. As the cores enter the third horizontal level they pass through a cooling zone so that as the cores come out of that zone and enter the unloading station the cores are cool enough to handle, and of course, no fumes are given off. This oven has capacity for 50,000 lb. of cores every 8 hr. The maximum temperature which is provided for the core oven is 650° F. although most of the core baking is done at temperatures between 450 and 550° F. Over-all dimensions are 52 ft. long by 13 ft. wide and 27 ft. high.

Mention R696 When Writing or Using Reader Service.

"Hardsteel"

Black Drill Co., 1400 E. 222nd St., Cleveland 17, Ohio

This new 24-page "Hardsteel" Operator's Manual contains revised tables on drilling speeds recommended for drilling hardened steels, amplified instructions on the correct procedure for wet and dry drilling, and complete new information on the application of "Hardsteel" in tool bits and tool tips used in machining the hard, tough steels and abrasive copper and aluminum alloys.

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The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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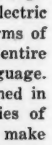

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